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A STUDY OF ADAPTABILITY IN A GROUP OF TEACHERS.[1]

BY DOROTHY M. DALDY

I.—*Aims and scope of enquiry.*
II.—*Definition of adaptation*
III.—*The value of domestic science teaching as a test of adaptability*
IV.—*The basis of teaching ability assessments.*
V.—*The scheme of enquiry*
VI.—*The investigation of home conditions.*
VII —*Distribution of good and difficult adaptations*
VIII —*Records made from case histories , analysis and comments on these.*
IX.—*Conclusions*

I.—AIMS AND SCOPE OF ENQUIRY.

THIS study was made with a group of thirty-one students of domestic science who were admitted to the college in the same term, and is part of a study of a much greater number of students.

The investigation sprang from the desire to find out if there is any truth in the supposition which is often encountered[2] that the teaching profession is a refuge for those who feel unable to cope with the exigencies of adult life, for those who find it difficult to achieve harmony within their own personalities or with the environment in which they live. Later, however, the enquiry developed into an effort to find out the causes of such ill-adaptation as was found, and to trace out its effect on the teaching ability of those concerned. The number of students studied is, of course, too small for wide generalization, but this paper will indicate a method of approach and give some results which are at least suggestive

The work of a lecturer in education lent itself admirably to such a study because one's raw materials are collected during the day-by-day events of one's life. Hence there is nothing artificial about the investigation ; and the first thing to do is to keep careful records of each day's work Thus each student must be given an assessment indicative of her teaching ability , each lesson heard must be analysed ; the failures and successes of each lesson must be discussed with the student who gave it.

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[1] This paper was read to the Psychology Section of the British Association, 1936 Some few amplifications have been made

[2] E g CLEMENCE DANE : *Regiment of Women* HUGH WALPOLE : *Mr Perrin and Mr. Trail*

In the effort to find out why any given student meets certain difficulties and to help her to overcome them, it is often necessary to discuss with the student her own personality and history, and though some are more forthcoming than others, and some one cannot help, yet nearly all take their teaching seriously, and once they realize that such discussions may help them, are willing to co-operate. Some students have definite worries which they are glad to talk over with a disinterested adult, and so in one way or another there is a wealth of material to work over

Each student was under observation for two years and taught in four or five different schools, and thus some degree of control and comparison was possible, since different students were observed teaching in the same school, and their reactions to very similar circumstances could be noted.

II.—DEFINITION OF ADAPTATION.

The following definition of adaptation was adopted, based on the conceptions of personality and of the neurotic personality as presented by Dr. R. G Gordon.[1] [2] Adaptation may be defined as "The power of the individual ego to adjust adequately to a situation without (*a*) undue emotional conflict for the individual, (*b*) disproportionate displays of emotion by the individual, (*c*) the production of conflict in the environment"

The situations observed were not restricted to those in the classroom. It was found that some do not exhibit those signs which indicate the painful conflicts they experience when they are dealing with children—possibly because in dealing with them they are in positions of authority, but analysis of their teaching performances shows as a rule that they share in some degree the weaknesses of those whose maladjustment is obvious in their behaviour in class, and who, incidentally, may not always show it so clearly elsewhere.

It is fruitless to attempt in a short article any description of symptoms which lead one to describe an individual as ill-adapted The reader is referred to the very extensive literature on the subject. It has been pointed out that in this investigation the judgments are, in the final analysis, subjective. This is freely admitted, for there does not appear to be any reliable alternative. The use of a questionnaire is of little value, in the opinion of the investigator, as a means of detecting maladjustment, and in any case these students disliked the method. Until and if better methods of measuring objectively such characteristics are devised, it seems probable that more reliable judgments on the whole will be made by those who have made a serious study of both the normally adjusted and the maladjusted personalities, and give careful consideration to each individual. "We need not be ashamed of the subjective method, provided we heed the objectivists' good advice."[1] The equipment of the investigator should include knowledge of her own personality and of her common reactions to different types of other personalities.

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[1] R. G GORDON *Personality—The International Library of Philosophy, Psychology and Scientific Method*

[2] R. G GORDON *The Neurotic Personality.—The International Library of Philosophy, Psychology and Scientific Method*

III.—THE VALUE OF DOMESTIC SCIENCE TEACHING AS A TEST OF ADAPTABILITY.

It should, perhaps, be pointed out that in an elementary school, in which most of these observations were made, the whole morning or afternoon is given up to a domestic science lesson Observation, therefore, is unhurried, and an observer sees the teacher tested in many ways About thirty minutes may be given to demonstration or other formal teaching, that is followed by or interspersed with, the girls' practical work, which affords an immediate check on the success of the previous teaching, and tests powers of organization, supervision, and observation A weak demonstrator may do well here; the successful demonstrator may fail. This is followed by routine cleaning—an excellent test of powers of discipline and sympathetic management of children—a summary of the lesson, and a criticism of finished work. Sometimes, however, there is no demonstration, and every one of twenty girls may be doing different work possibly in two or three different rooms, which is a severe test of a young teacher's power to realize what is going on round about her and to decide what she herself must do next. It must also be acknowledged that this subject is a worrying subject to teach. Other teachers are not dependent on daily deliveries of stores which sometimes arrive late, nor do families depend on the work done in their classes for food for dinner—a heavy responsibility; and, of course, there is an ever-present risk of accidents with boiling water and hot irons and fires.

IV.—BASIS OF TEACHING ABILITY ASSESSMENT.

Pittenberger[2] argues that teaching efficiency may be assessed on one of three planes:

(*a*) The plane of results.
(*b*) The plane of the teaching and learning process.
(*c*) The plane of the teacher's equipment for teaching—native and acquired.

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[1] HELEN WODEHOUSE *The Discernment of Disciplinary Values.—British Journal of Educational Psychology*, Vol. I, Part I

[2] B. F PITTENBERGER *Problems of Teacher Measurement.—Journ. of Educ. Psych.*, 1917, Vol VIII; p. 103

Cattell[1] points out that teaching ability is strictly only measurable on the first plane, but that by "empirically determining the relationship of the three planes it should be possible to establish criteria in any one of them. Ultimately we want to know what teaching ability means in terms of the third plane, that is of the character qualities of the teacher." In choosing the following "teaching factors" as fundamental to an assessment these criteria were borne in mind. The factors seem to be related fundamentally to success as judged by reference to the first and second planes, and, therefore, have been chosen as essential character qualities

To achieve a good assessment a student must be able to .

(*a*) Make contact with the pupils and enlist their interest.
(*b*) Select information satisfactorily, both as regards the dish taught and the reasons given for the method adopted.
(*c*) Ask useful questions
(*d*) Present information clearly, definitely and in a good sequence.
(*e*) Organize satisfactorily—e g., timing the lesson , sharing equipment.
(*f*) Supervize satisfactorily the work done both by groups and individuals.
(*g*) Maintain order satisfactorily.

It was also found that a certain quality of authoritativeness in the manner of the teacher was an important asset, as was the quality of calmness A quality described as "walled-off-ness" was found to be a disadvantage. Further notes on these are made later.

The students were then graded as follows :

A	Students whose	marks	numerically	are	80% and over
B	,,	,,	,,	,,	60% to 80%
C	,,	,,	,,	,,	45% to 60%
D	,,	,,	,,	,,	35% to 45%
Fail	,,	,,	,,	,,	Below 35%

The assessments of the students were checked by other members of the college staff, including lecturers in science and English, and by H.M. inspectors in the final examination.

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[1] R. B. Cattell. *The Assessment of Teaching Ability*.—*British Journal of Educational Psychology*, Vol I, Part I

V.—SCHEME OF ENQUIRY

The format for this is as follows:

Age.

Family history—i.e., number in family, financial position, home relationships, mental and nervous disease.

Grading of adaptabilty.

Observations suggesting poor adaptation (if any).

General remarks on teaching—i.e., General intelligence.
Best subjects
Manner
Method
Discipline.
Own interest.
Power to evoke interest.
Use of advice.
Further notes

N.B.—Intelligence was tested by means of the Group 33 Test of the National Institute of Industrial Psychology.

VI.—INVESTIGATION OF HOME CONDITIONS

The investigation into the home conditions was on the whole very superficial, and it was especially difficult to discover the family history in mental or nervous disease; but it is of some interest to note that more was learnt of the home conditions of those who were found to be ill-adapted than of those found to be well-adapted In this connection the interests of the Principal of the college, whose knowledge of the students is more extensive than anyone else's, is invaluable

It should be noted that in any case investigation into the home and private life of a student is a delicate affair, but in some cases there are additional complications when the students' difficulties of adaptation are unusually great. Some met with are already neurotic It should be stressed that an investigation such as this should only be made by those who have made a careful study of the problems of the neurotic and potentially neurotic, who realize the intense suffering such problems may cause and how great may be the need for intelligent help and sympathy, but who realize also the dangers of becoming the object of either positive or negative transference, and realize, too, the temptations to exploit the situation to which the investigator may be prone.

These risks need not deter the investigator who is properly qualified, more especially as neurotic students are apt to cause trouble in any case.

VII.—DISTRIBUTIONS OF GOOD AND DIFFICULT ADAPTATIONS

Amongst the thirty-one students seventeen were found to have difficulty in adaptation and fourteen to be well adapted

The contention put forward by Miss Birkinshaw[1] that domestic science teachers are conspicuously discontented with their work because it offers little scope for their domestic interests, though possibly true in secondary schools is not true in elementary schools nor during the training In an elementary school to-day the domestic scientist is one of those to whom most scope is afforded. It should also be noted that the entrants to domestic science colleges to-day have in most cases matriculated, and many hold higher school certificates. They have not then been accustomed to thinking of themselves as " no good for anything but domestic science," as once was supposed to be the case Six out of thirty-two entrants, of whom seventeen are ill-adapted, in the group succeeding this one had acted as school captain in their respective schools Domestic science work offers an outlet for maternal interests, and as regards the private life of the resident students in this college their freedom compares well in many respects with that of a university student. There seems no reason to suspect that these students should be more liable to suffer from maladjustment than any other type of students In fact the experience of the investigator suggests that an even higher preponderance of the maladjusted is found in normal training colleges and in university departments, which opinion was supported by discussion following this paper at the British Association Meeting.

VIII —RECORDS COMPILED FROM CASE HISTORIES.

TABLE I

DISTRIBUTION OF ASSESSMENTS AMONGST STUDENTS OF GOOD AND DIFFICULT ADAPTATION

Good Adaptation		*Difficult Adaptation.*	
A	1	A	1
B	6	B	3
C	7	C	10
D	0	D	2
Fail	0	Fail	1
	14		17

---

[1] MARY BIRKINSHAW *The Successful Teacher* (Hogarth, 1935.)

Of fourteen teachers who are well adapted seven (A, 1, B, 6) are recognized as good teachers, and the remaining seven as satisfactory (Four were high up in the C class.)

Of seventeen teachers who are ill-adapted only four are classed as good; ten as satisfactory (though in many cases these are near the bottom of the C class), two as weak, and one as a failure

This goes to show that on the whole teachers who have achieved good adaptation make the better teachers, and also that the bulk of those who are ill-adapted are found in the lower grades. Is this possibly related to the finding of A Lloyd Evans[1] that the better student values psychology because she is stimulated to valuable self-analysis, whereas the weaker student is afraid of it? Introspection to the ill-adapted is painful and fatiguing

It may be noted that the difference between the two weak teachers and the failure lay in the former's having developed some will to make contact with their class and some power to try to get what they wanted.

It is also noteworthy that among the seven good teachers who are well adapted there is an aggressive streak which prevents them from accepting bad conditions when they find them. They lack the readiness to put up with what they find, a passivity, which was noted amongst those well adapted teachers who only gained a C grade. In fact, amongst the A and B teachers their good adaptation seems to break down sometimes, though it is recaptured when the environment has been modified or they have learnt how to deal with it. A striking difference between those who are ill-adapted and those who are well adapted is that discomfort of an environment which they cannot control led the latter to make greater efforts to cope with it, whereas it made the former more ineffective as their discomfort increased

Tables III to XIV show the distribution of ability and adaptability to "teaching factors" into which teaching ability was analysed. For convenience in tabulation each student was regarded as reacting either positively or negatively to each "test" Thus if a student was a poor disciplinarian she was marked "negative" with regard to the power to maintain discipline. If any uncertainty arose the student was given the benefit of the doubt, as it was felt that there was a possibility of attaching too much interest to the disabilities of the ill-adapted.

(*a*) ***Manner.***

This was assessed from three standpoints authoritativeness, calmness, and that quality which can best be described as "walled-offness"

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[1] A. LLOYD EVANS *The Place of Psychology in the Training of Teachers.—British Journal of Educational Psychology*, Vol. V, Part III

It has been suggested that unless extremes are referred to it is difficult to decide if an individual lacks a quality or not, and the same objection has been raised to the assessment of contact established with a class In reply it can only be said that in practice these qualities were amongst the easiest to be certain about. The behaviour of the children is a very clear guide to a judgment of the teacher in these respects.

Authoritativeness.—This is that quality described by the "Concise Oxford Dictionary" as "proceeding from competent authority." The teacher possessing it is not necessarily dogmatic or commanding, for it springs from the security of feeling equal to a situation, and that, of course, may be the withdrawing into the background to let the pupils work according to their own devices.

TABLE II

DISTRIBUTION OF AUTHORITATIVENESS AMONG STUDENTS OF VARYING TEACHING ABILITY WHO SHOW

Good Adaptation		*Difficult Adaptation*	
Plus	*Negative*	*Plus*	*Negative*
A . . 1		A . . 1	
B . . 5	B . . 1	B . . 3	
C . . 5	C . . 2	C . . 1	C . . 9
			D . . 2
			Fail . . 1
11	3	5	12

(Plus and Negative indicate the possession or lack of the quality)

This table shows that authoritativeness is a quality common to the good teachers whatever their adaptability, but that among the weaker ones it is frequent amongst the well-adapted teachers, but rare amongst the ill-adapted ones. This deficiency occasions much of their difficulty in teaching, as the quality is essential to the convincing presentation of matter, and to maintaining order.

Calmness.—This quality can best be described as "tranquillity." Unless a teacher shows in a marked degree either the possession or the lack of this quality it does not affect her teaching, and, therefore, not every student appears in the following table. Not essential to good teaching, its possession determines teaching style, and it is a very important characteristic for it creates an atmosphere in which children can work to the best of their ability In four cases it won for a student her high mark. Marked lack of this quality in a teacher has an opposite effect; it creates an atmosphere of unrest and uncertainty which is prejudicial to good work.

TABLE III.

DISTRIBUTION OF CALMNESS AMONG STUDENTS OF VARYING TEACHING *ABILITIES WHO SHOW*

Good Adaptation.		*Difficult Adaptation*	
Plus	*Negative*	*Plus*	*Negative*
A .. 1		A . 1	
B . . . 3		B .. 2	B . 1
C ... 2	C . 3		C . 7
			D 2
6	3	3	10

(Plus and Negative indicate lack or possession of the quality)

This shows that calmness though common to many of the good teachers is definitely lacking amongst many of the weaker ill-adapted teachers

"*Walled-off-ness.*"—This is an undesirable characteristic as it implies at least fear of, and in some cases hostility to, other people It was well summed up by the head mistress who observed " that student always makes me feel that she wishes that I and every one else would go at least twenty yards away from her." This is very different from dignity which forbids familiarity To protect themselves the individuals become inaccessible to their pupils. They do so in various ways. Some, for instance, are cold and impersonal; others distraites, others shrinking, one was almost openly hostile, and so on.

TABLE IV

DISTRIBUTION OF "WALLED-OFF-NESS" AMONG STUDENTS OF VARYING TEACHING ABILITIES WHO SHOW:

Good Adaptation		*Difficult Adaptation*	
Plus	*Negative*	*Plus*	*Negative*
	A 1		A . 1
	B 6		B . . 3
C 17	C . 6	C ... 9	C . .. 1
		D . .. 2	
		Fail . . 1	
17	13	12	5

This shows clearly that the characteristic of "walled-off-ness" is not found in the well-adapted teachers whatever their abilities; nor is it found in the good teachers of difficult adaptation. It is a marked defect among the weaker ill-adapted teachers It is one of their chief disabilities and, as the next table illustrates, is connected with the power to make contact with those taught.

(b) *Contact with Pupils.*

This is distinguished from the "manner qualities" because those describe characteristics of the teacher's attitude to her pupils, and this describes the relationship between them. Awareness of each other is the essential of good contact between teacher and taught, and lack of it on the part of the children is one sign of inability on the part of the teacher to establish contact Lack of such awareness is a frequent concomitant of "walled-off-ness," but need not imply it, for cases have been observed, though only once in this particular group, in which it sprang from the teacher's lack of comprehension of a situation rather than from her emotional ill-adjustment.

TABLE V

DISTRIBUTION OF THE POWER TO MAKE CONTACT WITH PUPILS AMONG STUDENTS OF VARYING TEACHING ABILITIES WHO SHOW

Good Adaptation.		*Difficult Adaptation*	
Plus	*Negative*	*Plus*	*Negative*
A 1 B . ... 5+1? C ... 3+3?	C 1	A . .. 1 B . 2+1?* C 1	C ... 9 D ... 2 Fail . 1
9+4	1	4+1	12

* Depends on mood

This shows that the power to make contact with those taught is possessed by nearly all well-adapted teachers It is extremely important in teaching as without it there can be little or no co-operation with the class, nor prompt and right reaction to the needs of the class It is lacked by nearly all the weaker teachers who are ill-adapted.

(*c*) *Presentation of Matter.*

This was assessed from the following criteria · the power to make definite statements , to be clear ; to achieve good sequence , to ask useful questions

The power to make definiate statements and to be clear.—These are considered together as superficially they would seem to be very similar. In practice, they are not, as reference to the following table shows Four of the ill-adapted teachers are described as definite, but eleven of them are described as clear. An adult may be able to summarize the chief points of an argument and pick out the essentials of a clear statement for himself , but children must be given more assistance than that. For them the use of sub-headings, summaries, repetitions, is essential if they are to gain in the end a clear outline of the whole ; and the power to give such assistance is here described as the power to be definite.

TABLE VI.

DISTRIBUTION OF THE POWER TO MAKE DEFINITE STATEMENTS AND CLEAR STATEMENTS AMONG STUDENTS OF VARYING TEACHING ABILITIES WHO SHOW .

Good Adaptation				*Difficult Adaptation*			
Definite Statement		*Clear Statement*		*Definite Statement*		*Clear Statement*	
Plus	*Negative*	*Plus*	*Negative*	*Plus*	*Negative*	*Plus*	*Negative*
A , 1		A . 1		A 1		A 1	
B , 6		B 6		B 1+2?		B 3	
C . 5	C 2	C .. 5	C 2	C . 0	C 10	C 5	C 5
					D 2	D 1	D 1
					Fail 1	Fail 1	
12	2	12	2	2+2?	13	11	6

Twelve of the fourteen well-adapted students are both definite and clear in their statements ; eleven of the ill-adapted students are clear but only four are definite, and of these two were given the benefit of the doubt. These results illustrate the practical difference between the two characteristics.

The falling-off of the power to be definite noted amongst the low-grade ill-adapted teachers seems to spring from their fear of being in the wrong, and their reluctance to commit themselves It is a very serious weakness which often prevents the class benefiting from a well-prepared lesson

The power to achieve good sequence and to ask useful questions — These two factors are again related to each other as is shown by the results given in the following table for the teachers who are well adapted. Seven achieve good sequence, and six of these ask useful questions. This is to be expected as the ability to appreciate sequence would logically lead to the power to ask questions so worded as to produce the answer needed, and to realizing the value of questions in developing an argument That they are not the same is, however, shown by the result for the ill-adapted teachers. Of these, eight achieve good sequence but only two ask useful questions.

In the following table the interesting differences in the distribution of these powers amongst the different grades in the two groups should be noted Among the well-adapted the good teachers achieve a good sequence —the weaker teachers do not. Amongst the ill-adapted teachers the power to achieve a good sequence is found in all grades

TABLE VII

DISTRIBUTION OF THE POWER TO ACHIEVE GOOD SEQUENCE AND TO ASK USEFUL QUESTIONS AMONGST STUDENTS OF VARYING TEACHING ABILITIES WHO SHOW

Good Adaptation				*Difficult Adaptation*			
Good Sequence		*Good Questions*		*Good Sequence*		*Good Questions*	
Plus.	*Negative*	*Plus*	*Negative*	*Plus*	*Negative*	*Plus*	*Negative*
A 1		A . 1		A 1		A 1	
B . 6		B . 5	B 1	B 1	B 2	B 1	B 2
	C 7		C . 7	C 5	C . 5		C 10
				D 1	D . 1		D 2
					Fail 1		Fail 1
7	7	6	8	8	9	2	15

(Plus and Negative indicate possession or lack of the quality)

A teacher can achieve a good sequence independently of those taught; good questioning implies co-operation with those taught. The weakness of the ill-adapted teachers in asking questions was in six cases due to the lack of questions and not, as in the case of the other nine ill-adapted teachers and the eight well-adapted who share this weakness, to muddled or pointless questions.

The marked weakness of the ill-adapted teachers to ask questions seems related to their desire to keep the lesson in their own hands; to dislike of an unexpected answer, and to their being unused to co-operate with others

Amongst the better grade teachers of either type there is found an ability to achieve good sequence, and the fact that six of the lower grade ill-adapted teachers also achieve it, whereas none of the lower grade well-adapted teachers do so, suggests that the six former are potentially better teachers than their actual grade.

(*d*) *Management of Practice Class*

This was considered from two standpoints: those of previous organization and of supervision of the actual work of the children, when the power to carry out previously made plans was also examined.

Organization of Practice Class.

TABLE VIII.

DISTRIBUTION OF THE POWER TO ORGANIZE A PRACTICE CLASS WELL AMONGST STUDENTS OF VARYING TEACHING ABILITY WHO SHOW:

Good Adaptation		*Difficult Adaptation*	
Plus	*Negative*	*Plus.*	*Negative*
A . 1		A . . 1	
B 6		B . . 1+2?	
C 2	C . 5	C . .. 6	C .. . 4
			D . .. 2
			Fail ... 1
9	5	8+2?	7

(Plus and Negative indicate possession or lack of this power.)

Of the well-adapted teachers, nine of the better ones show the power to organize well beforehand, and five of the weaker ones do not (The two C grade teachers numbered with the nine were, in point of fact, the two at the top of that grade) Of the ill-adapted teachers there are two of the higher grade ones whose power to do so is doubtful, two whose power is definite, and there are six of the lower grade teachers who also have this power. The organization is carried out *beforehand*, and, therefore, the particular six ill-adapted are not handicapped by the particular disability of ill-adaptation. The next table shows their power of execution is not equal to their power to organize This discrepancy between preparation and execution suggests that the six ill-adapted teachers are potentially better teachers than their grade, and the fact that they are the same individuals as noted in the previous table as capable of achieving good sequence is further evidence of this

Supervision of Practice Class

TABLE IX.

DISTRIBUTION OF THE POWER TO SUPERVISE A PRACTICE CLASS WELL AMONGST STUDENTS OF VARYING TEACHING ABILITY WHO SHOW:

Good Adaptation		*Difficult Adaptation*	
Plus	*Negative*	*Plus*	*Negative.*
A 1		A . 1	
B . 6		B . +3?	
C . . 3	C . 4	C . . 2	C .. 8
			D . 2
			Fail 1
10	4	3+3?	11

(Plus and Negative indicate possession or lack of this power)

Of the well-adapted students ten students can supervise the work of both groups and individuals satisfactorily, and four of the weaker ones cannot. In the ill-adapted students there is a preponderance of those who cannot. The two students marked with a query proved competent to deal with individuals, but not with groups The difficulties and failures of the ill-adapted in this respect arise from their poor powers of response to stimulus, and from their difficulty in ordering their sense impressions. A confused environment intensifies their emotional discomfort, and they become more ineffectual

(*e*) ***Discipline.***

TABLE X

DISTRIBUTION OF THE POWER TO MAINTAIN DISCIPLINE SATISFACTORILY AMONG STUDENTS OF VARYING TEACHING ABILITY WHO SHOW:

Good Adaptation		*Difficult Adaptation*	
Plus	*Negative*	*Plus*	*Negative*
A 1		A 1	
B ... 6		B ... 1+2?	
C. 5	C 2	C .. . 1	C 9
			D 2
			Fail . 1
12	2	3+2	12

(Plus and Negative indicate possession or lack of this power.)

Twelve out of fourteen well-adapted students possess this power, twelve out of seventeen ill-adapted students lack it, and possibly two more of this group lack it as well Here there is the same falling off amongst the ill-adapted students as there is in supervision, and the same explanation applies to it.

In matters of discipline the difference between the two types is very marked, the well-adapted being usually incited to stronger efforts by disorder, while the ill-adapted make weaker efforts than is usual to them when things are going well The failure of the two well-adapted C grade teachers to deal with problems of discipline arises from their willingness to adapt to a situation rather than change it Both could deal with disorder which reached a pitch which disturbed their equanimity.

(*f*) *Interest*

This was considered from two aspects. the interest of the teachers themselves in the subject and their power to evoke it in others.

Interest of the Students.

TABLE XI

DISTRIBUTION OF INTEREST IN THE SUBJECT TAUGHT AMONGST STUDENTS OF VARYING TEACHING ABILITY WHO SHOW

Good Adaptation		*Difficult Adaptation.*	
Plus	*Negative*	*Plus*	*Negative*
A 1		A 1	
B. ... 5+1		B. .. 3	
C.. . . 6+1		C . .. 4+2	C . 4
			D . . 2
		Fail 1	
12+2	0	9+2	6

(Plus and Negative indicate possession or lack of this characteristic)

None of the well-adapted teachers are definitely uninterested in their subject, but six of the ill-adapted students are In each case, however, the lack of interest springs rather from a low zest for life than from an active dislike of the subject It intensifies ill-adaptation, and further reduces the efforts to teach adequately, it also increases the difficulty of awakening the interest of the class

Power to Evoke Interest.

TABLE XII.

DISTRIBUTION OF THE POWER TO EVOKE INTEREST AMONG STUDENTS OF VARYING TEACHING ABILITY WHO SHOW

Good Adaptation.		*Difficult Adaptation.*	
Plus.	*Negative.*	*Plus.*	*Negative.*
A . . . 1		A 1	
B.. .. 5	B 1	B ... 3	
C 4	C .. 3	C 1	C . 9
			D . . 2
			Fail 1
10	4	5	12

(Plus and Negative indicate possession or lack of this power)

Ten of the well-adapted students possess this power to evoke interest, and it may be noted that of the other four two did not dispel any of the spontaneous interest of the children, twelve of the ill-adapted students lack this power. Previous tables have indicated that the ill-adapted teachers of the lower grades are "walled off" and have difficulty in making contact with those taught, and also that in some cases they have no interest in the subject. These characteristics seem to explain their lack of power to evoke interest Of the interest felt by the five ill-adapted low grade students who claim to feel it, no trace appeared in their teaching, and this was in keeping with a reluctance shown in other ways, such as essay writing, to express their feelings

Sherman Littler gives as usual reasons for the failure of teachers: poor discipline, weakness of personality (which seems to be too vague a term to be useful); lack of teaching skill, laziness, failure to co-operate.[1]

Miss Moses quotes: poor instruction, weakness of personality; lack of interest, weakeness of discipline, lack of sympathy, inability to co-operate, unprofessional attitude, weakness in knowledge of subject matter, disloyalty, immorality; poor health [1]

(g) *Use of Advice.*

Advice given was of two kinds: technical advice, as, for example, on methods of arranging work or maintaining order, and personal advice, as, for example, on the management of relationships with people, or personal difficulties.

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[1] Quoted by G. E BIRD. *Pupils' Estimates of Teachers.—Journal of Educ. Psych.*, 1917, VIII, p. 35

Technical Advice.

TABLE XIII.

DISTRIBUTION OF THE POWER TO USE TECHNICAL ADVICE AMONG STUDENTS OF VARYING TEACHING ABILITY WHO SHOW:

Good Adaptation.		*Difficult Adaptation.*	
Plus	*Negative*	*Plus.*	*Negative.*
A . . 1		A 1	
B 6		B 3	
C 2	C .. 5	C 6	C 4
			D 2
			Fail .. 1
9	5	10	7

(Plus and Negative indicate possession or lack of this power.)

Nine well-adapted students show the power to apply technical advice and five do not. In the case of the latter the power is limited either by intelligence or goodwill. In the case of the seven ill-adapted students who failed to use technical advice, it was also, if not solely, limited by their defective powers of self-assertion In this connection, too, allowance must be made for the fact that any one adviser is not likely to prove equally helpful to each of thirty-one students.

Use of Personal Advice.

Nine of the ill-adapted students were helped to divert their attention from themselves to their pupils' progress or to the matter of the lesson. Eight of them were not able to do this.

Eight of the ill-adapted students found temporary relief by talking over their difficulties, and in five cases this was followed by a better teaching mark.

* * * *

After the characteristics of the different grades and of the two types had been noted, an attempt was made to find some explanation of these characteristics from a study of the intelligence of these students and of their home conditions.

Study of the Intelligence of the Students

For this purpose the Intelligence Test No. 33 of the National Institute of Industrial Psychology was used, supplemented by the college records of work in other subjects.

In the following table the grouping follows that given by the Institute as the normal marks gained by boys of different chronological ages at a high-grade secondary school.

TABLE XIV.

DISTRIBUTION OF INTELLIGENCE AMONG STUDENTS OF VARYING TEACHING ABILITY WHO SHOW EITHER GOOD OR DIFFICULT ADAPTATION :

Marks Gained.	*Good Adaptation*		*Difficult Adaptation.*		
150 0—190 0. ...	B . 2	C . 1	C 3		
148 4—150·0.			C . 1		
137·6—148 4 .	A .. 1	B 1	C . 1		
133·6—137 6. . .	B .. 1		B . 2	C ... 1	
126·6—133·6. .	C .. 1		A ... 1	C . . 2	
0—126·6 . .	*B .. 1	C. .. 3	†B 1	C. 1	D .. 1

*Not borne out by other work
† Student over thirty

These results show clearly that in this group intelligence is not the determining factor in either differences of adaptability or of teaching ability, though amongst the teachers who are well adapted the more intelligent are on the whole the better teachers The results suggest that a teacher needs a reasonably good level of intelligence if she is to be successful, and, if so, six teachers in the ill-adapted group may be potentially better teachers than they are in practice, and their actual performance may be determined by their difficulty in adaptation acting as a handicap.

Pinsent[1] agrees that intelligence is not the determining factor in the success of a teacher ; Cattell[2] found that no successful teacher had an I.Q. of less than 100, though several were at or near that figure. These findings seem to agree with those made with this group of students

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[1] A PINSENT *Teaching Success of University Students*—*British Journal of Educational Psychology*, Vol III, Part II

[2] R B CATTELL *The Assessment of Teaching Ability*—*British Journal of Educational Psychology*, Vol I, Part I.

Home Conditions

(1) *Home Conditions of Well-adapted Students*

All reported they were happy at home

Two had lost mother and one her father. None spoke of trouble at home.

(2) *Home Conditions of Ill-adapted Students*

Fourteen reported that they were happy at home

Three had lost father; ten spoke of difficulty or trouble at home.

Three reported they were unhappy at home, one of these had lost her father.

Nervous or Mental Trouble in the Home.

(1) *Amongst the Well-adapted Students.*

None noted.

(2) *Amongst the Ill-adapted Students*

Two cases of neurosis in the family, one case of insanity.

As previously noted, this enquiry into the home conditions was very superficial; but so far as it goes it suggests that difficult home conditions and nervous or mental trouble in the family have a definite bearing on the facility of adaptation.

IX.—CONCLUSIONS.

(1) Though intelligence of a reasonably good level is needed to teach well, several of the C grade teachers show higher intellectual ability than those of the A and B grades.

(2) Ability to teach is apparently affected by difficulty in adaptation. The fact that relief obtained by discussing difficulties was followed by improvement in teaching goes to show that the result of unresolved conflicts in the personality is to reduce teaching ability

(In the case of the teacher of marked ability who is yet described as ill-adapted, conflict seems localized at present, and in class she is quite happy)

(3) The teachers suffering from difficulty in adaptation seem to be handicapped in particular by being unable to:

(*a*) Express themselves definitely.

(*b*) React quickly to changes in their environment or to order their sense impressions

(*c*) Make contact with their pupils or interest them

(*d*) Concentrate.

(4) In this group the proportion of those who find difficulty in adaptation is approximately half, which suggests that the number of ill-adapted individuals entering the profession may be large.

(5) There is evidence for thinking that too great a facility of adaptation might produce too ready acquiescence in conditions as they are given, and this militates against success in teaching.

* * * *

(My thanks are due to Miss M. C. Pepper for allowing me to carry out this investigation and for her helpful advice; and to Dr. R. G. Gordon for his sustained interest, teaching and criticism.—D.M.D.)

RÉSUMÉ

UNE ÉTUDE DE L'ADAPTATION DANS UN GROUPE DE MAÎTRESSES D'ÉCOLE

LA MÉTHODE. L'on étudia 31 étudiantes de l'économie domestique pendant leur préparation professionnelle. L'on arrangea une entrevue personnelle avec chaque étudiante ; l'on appliqua à chacune des tests d'intelligence et décerna à chacune une note indiquant son aptitude à l'enseignement ; l'on examina aussi, bien qu'imparfaitement, la vie privée de chacune. Chacune fut classée comme bien ou mal adaptée selon sa capacité de s'ajuster à des situations nouvelles ou en dedans ou en dehors de l'école, sans (1) une tension émotive exagerée, (2) des manifestations disproportionnées d'émotion, (3) la création de conflits ou de froissements dans son milieu. L'aptitude à l'enseignement fut calculée au moyen d'une analyse en " facteurs pédagogiques " choisis, et des tables montrant la distribution des aptitudes et de la capacité de s'adapter à chaque facteur et aux conditions de la vie privée, furent dressées.

LES RÉSULTATS. (1) Dix-sept étudiantes étaient mal adapteés, quatorze étaient bien adaptées, (2) L'intelligence seule ne déterminait pas l'aptitude à l'enseignement, (3) Les maîtresses mal adaptées étaient entravées surtout par leur incapacité de s'exprimer d'une façon précise, de concentrer leur attention, de coordonner et d'interpréter des impressions sensorielles, de répondre rapidement à des stimulations, de se mettre en rapport avec leurs élèves, d'éveiller l'intérêt, (4) La capacité d'adaptation surdéveloppée entravait les maîtresses.

ZUSAMMENFASSUNG

EINE UNTERSUCHUNG DER ANPASSUNGSFÄHIGKEIT BEI EINER GRUPPE VON LEHRERINNEN

VERFAHREN: Einunddreissig Studentinnen der Hauswirtschaft wurden während ihrer Ausbildung beobachtet. Man unterhielt sich mit jeder Studentin, die Intelligenz jeder einzelnen wurde untersucht; jede erhielt eine Note für ihre

Lehrfähigkeit und man zog, wenn auch ungenügend, die Familienverhältnisse jeder Studentin in Betracht. Jede wurde eingestuft nach ihrer guten oder minderen Fähigkeit, sich innerhalb oder ausserhalb der Schule ohne: (1) zu grosse Gefühlsanstrengung; (2) unverhältnismässige Gefühlsschau; (3) Erzeugung von Streit oder Reibereien der Umgebung an bestimmte Situationen anzupassen. Lehrfähigkeit wurde geschätzt, indem man sie in ausgewählte "Lehrfaktoren" zerlegte, und es wurden Tabellen angefertigt, die die Verteilung von Können und Anpassungsfähigkeit auf jeden Faktor und auf häusliche Zustände zeigten.

ENDERGEBNISSE: (1) Siebzehn Studentinnen waren schlecht anpassungsfähig, vierzehn waren gut anpassungsfähig; (2) Nicht die Intelligenz allein bestimmte die Lehrfähigkeit; (3) Schlecht anpassungsfähige Lehrerinnen wurden besonders behindert durch die Unfähigkeit, genau zu sein, sich zu konzentrieren, Sinneseindrücke wiederzugeben und zu deuten, auf Reize schnell zu reagieren, Fühlung mit ihren Schülerinnen zu gewinnen, Interesse anzuregen; (4) Zu grosse Anpassungsfähigkeit bildete eine Hemmung für Lehrerinnen.

AN ENQUIRY CONCERNING THE PRACTICABILITY OF TYPICAL EDUCATIONAL AIMS.

By E. J. R. EAGLESHAM
(Department of Education, University of Manchester)

I.—*The purpose of the enquiry.*
II.—*The procedure.*
III.—*Intellectual aims and their assessment*
IV.—*Preparatory aims and their assessment.*
V.—*Ethical aims and their assessment.*
VI.—*Averages for the three classes of aims*
VII.—*Manual training aim and its assessment*
VIII.—*Correlation between scores of the four categories of assessors.*
IX.—*Conclusions and summary*

I.—THE PURPOSE OF THE ENQUIRY.

IT is an all-too-common complaint that the educational theories current in training colleges and university education departments are remote from practice, and that the student who leaves his training brimful of ideals becomes quickly disillusioned, when, as a teacher, he finds himself little more than a cog in the educational machine. On the other hand, the Board of Education, in its *Handbook of Suggestions for Teachers*, emphatically asserts (p 10) that every teacher ought to have intelligent aims, consciously held, subject to review from time to time, and rendering his practice both more vital and more worth while.

In the investigation outlined below the writer attempted to discover what aims educationalists advocate, and think practicable in elementary schools, and what aims teachers do in practice follow.

II.—THE PROCEDURE.

A questionnaire was prepared, embracing twenty-eight aims from a number of sources, including most aims contained in the Board's *Handbook*. The directions required every contributor to assess each aim on the basis of its practical importance, i.e, the extent to which he would himself follow such an aim in teaching children aged thirteen in an elementary school The assessment was to be on a five-point scale, A, B, C, D, E·

A for aims of the greatest practical importance to the assessor—aims which would determine his work from day to day in teaching such a class every subject.

B for aims regarded as influential, but not so vitally important as aims marked A.

C for aims likely to affect the conduct of the assessor to a moderate extent only.

D for aims which would affect his conduct only slightly or very rarely.

E for aims which would not influence the assessor to any appreciable extent

To ensure that each assessor made full use of the marking system, it was suggested that he should use each mark about five times; but it was emphasized that this was merely a suggestion. There was to be no rigidity Also, to encourage frankness, assessors were assured that individual results would be treated as confidential, and they were asked not to attach their names.

The questionnaire was first tried out on a number of Scottish teachers, but it was found unnecessary to make more than two alterations in the directions. These were so minor as not to vitiate comparison with the later results. The questionnaire was then submitted to individuals engaged in educational work in England. In all, replies were received from the following four categories of assessors

(*a*) Thirty-one Scottish teachers (including seven head masters).

(*b*) Forty-one teachers in England (eleven of these were elementary headmasters and twelve were secondary teachers).

(*c*) Thirty-two "educationalists." This is a wide category It includes three directors of education, six inspectors, five professors of education, and eighteen lecturers in education. Some of these may be predominantly interested in educational theory, while others would regard themselves as mainly interested in practical teaching, and others again as administrators. But the factor common to all in this category is that, while education is their professional interest, they are not actually teaching school-children

(*d*) Forty-eight students who had just completed training in an English university education department

The total number of replies was 152. Two of these papers had to be rejected as "spoiled."

In the questionnaire the twenty-eight aims were arranged and numbered consecutively, without any express classification, although aims of the same nature were in fact grouped together. For our purpose, however, we may divide the aims into three main categories. Intellectual, Preparatory, and Ethical. In the intellectual group fall nine aims which deal primarily (though not exclusively) with the development of the cognitive aspect of the child's mind In the preparatory group fall seven aims which appear to subject the educational process to some end external to that process. In the ethical group fall eleven aims which concern themselves mainly with the development of some aspect of character A final aim deals with manual work Obviously the three main classes will overlap to some extent thus many will argue that "Citizenship" (Aim No 23) is a preparatory aim I have with diffidence included it in the ethical class, because supporters of this aim tend to advocate a training of outlook and character which is more suited to the present nature of the child than the purely preparatory aims And similarly with "Leisure" (Aim No 2) The division is, after all, bound to be a matter of degree rather than of kind, and our classification is largely an expedient for convenience of treatment

For each of the four groups of assessors the results were tabulated question by question, and it was decided, in order to give a synoptic view of the total assessments, to assign four marks for the letter A, three for B, two for C, one for D, and none for E Thus "Observation" (Aim No. 1) was assessed as A by thirty-one students, as B by ten, as C by six, and as D or E by none (one student had a spoiled paper) Hence the total score for the student group for this aim was 166

For purposes of ready comparison within each group and from group to group, the total scores given to aims were then arranged in order. The five aims ranked highest by any group were given a group assessment of A The last five were classed as E The remaining eighteen aims were placed into categories of six, and marked B, C, or D. These group assessments, though somewhat arbitrarily assigned, give a better picture of the group result for any aim than would be gained by simply taking the modal assessment. Thus, for English teachers, Aim No 2, with sixteen A's, thirteen B's, ten C's, and one D, had a modal assessment of A But its group assessment, derived by the above method, was B As contrasted with the total score, the group assessment has the advantage of being readily comparable from group to group

In Tables I to III I have quoted the four group assessments alongside the respective total scores. With them are also given the mean variations from the group assessments These mean variations are calculated in terms of places, and considerably qualify the pictures drawn by the group assessments. Thus for teachers in England the group assessment for Aim No 20, "Obedience" (see p. 32), was D. But this was derived from seven A's, nine B's, twelve C's, two D's, and eleven E's—an extraordinary amount of disagreement. The mean variation was therefore.

(7 × 3) + (9 × 2) + (12 × 1) + (11 × 1) ÷ 41 = 1 51. Mean variations of over 1 2 may indeed be taken as indicating almost complete disagreement among the group of assessors in question. The results show that this was the case with about one-third of the group assessments

A gross score is also quoted for each aim, calculated by adding the total scores for the four groups By arranging these gross scores in the same way as was done with the total scores, overall assessments were found. These are given in the second column of Tables I to III and represent the opinion of all the 150 assessors, in so far as there could be said to be any agreement.

III —INTELLECTUAL AIMS AND THEIR ASSESSMENT

(The numbers represent the order of the aims in the questionnaire. For the purpose of this paper, though not in the original questionnaire, I have added in brackets a term descriptive of such aim, and one or more sources in which each aim is stated or implied.)

(1) (Observation *B of E. Handbook*.) To establish in the child habits of observation and of lively attention to what goes on around him.

(3) (Expression EDMOND HOLMES.) To allow the child to express all his inborn intellectual capacities.

(4) (Development · WATTS. *Education for Self-realisation and Social Service*) To lead the child to develop his inborn intellectual capacities in the manner which you think will be best for himself and for society

(5) (Language · *B of E. Handbook*) To give the child power over language and a taste for good reading

(6) (Formal Discipline · LOCKE.) To make the child's mind more efficient by the study of difficult problems and systematic training in such subjects as grammar

(7) (Equalising Chances · BAGLEY) To give the ordinary child a better chance of competing with more intelligent ones, by giving him access to the products of brilliant minds in the past

(8) (Activity : FERRIÈRE) To give an outlet to the child's great longing for mental and physical activity.

(9) (Impartiality : DEWEY.) To establish in the child's mind the habit of suspending his judgment and carefully investigating the relevant facts before arriving at any important conclusion

(10) (Fact Assimilation . HERBERT SPENCER.) To enable the child to assimilate the main facts that science has discovered.

In the table below, the intellectual aims have been arranged in the order of their gross scores (It should be remembered that the group assessments and overall assessments are derived by ranking *all* the aims, not solely the intellectual aims of Table I.)

TABLE I.

ASSESSMENTS OF INTELLECTUAL AIMS.

Aim	*Gross Score*	*Overall Assessment*	*English Teachers*			*Scottish Teachers*			*Educationalists*			*Students*		
			Total Score.	*Group Assessment.*	*Mean Variation*	*Total Score*	*Group Assessment*	*Mean Variation*	*Total Score*	*Group Assessment*	*Mean Variation*	*Total Score*	*Group Assessment*	*Mean Variation*
(1) Observation ..	484	A	142	A	·51	93	A	·85	83	B	1·03	166	A	·46
(5) Language .	448	A	123	B	·73	82	A	1·18	97	A	84	146	A	·88
(9) Impartiality . .	435	A	124	A	·98	63	C	1·07	98	A	·81	150	A	·79
(8) Activity .. .	415	B	117	B	·83	67	C	1 18	81	C	1·29	150	A	79
(4) Development . .	389	B	124	A	·98	75	B	1·04	79	C	1 35	111	C	1 23
(3) Expression . ..	363	C	104	C	1·24	63	C	96	61	C	1·28	135	B	92
(10) Fact Assimilation . ..	244	D	71	D	1·02	40	E	1·33	56	D	1·03	77	D	·92
(6) Formal Discipline	190	E	76	D	1·23	37	E	1·29	36	E	1·00	41	E	85
(7) Equalizing Chances ...	160	E	52	E	1 23	24	E	·85	24	E	·74	60	E	1 21

N.B.—A Mean Variation of 1·2 or more indicates almost complete disagreement among assessors.

Through the mean variations these results show a very considerable amount of disagreement within groups, as might reasonably have been anticipated. Within each group there is most agreement where the aims have been assessed highly. There is, however, a less noticeable tendency to agree at the other end of the scale, two of the groups are fairly unanimous in condemning the last aim. On the other hand, both here and elsewhere there is an unexpected amount of agreement between group assessments. This will be borne out by the correlation coefficients for the whole questionnaire. If we combine the category of "educationalists," as previously defined, with that of students, who have taken a course in education but have not yet shouldered the full responsibility of the class-teacher, and compare their assessments with those of the actual teachers, we find little evidence of that fundamental disagreement between theory and practice which is commonly alleged, and which I had in truth expected to find, although occasional instances of disagreement, more or less marked, do occur.

It is remarkable that "Observation" should have been ranked so highly by all except educationalists It has, in fact, the largest gross score of any of the twenty-eight aims. It was inserted to find out how far the cultivation of attention and observation for their own sakes was still an aim in schools It will be noted that the statement of aim contains no hint of discrimination or of underlying interests the alertness of a kitten would almost satisfy its requirements The result certainly seems to support Dewey's contention that our schools are still in danger of fostering habits of divided attention. It suggests that some fallacies of the faculty psychology are still widely prevalent It is, however, conceivable that the bulk of the assessors understood the aim to convey some such ideal as H G Wells puts before us in *The Work, Wealth, and Happiness of Mankind* "Our world is now launched upon a perpetual investigation and innovation and its ideal of education is no longer the establishment of a static ideology, but the creation of a receptive and co-operative alertness. For that no fixed and unalterable teaching will suffice" It would be comforting to believe that such was the ideal of our assessors

Aim No. 5, "Language," comes from the Board's *Handbook*, which forcibly argues that some such aim should be followed by every teacher "as an essential condition of teaching any subject successfully" (p. 66). Yet it has fared worse among teachers in England than among the other assessors The next aim, "Impartiality," is based on ideals found, notably, in Dewey's *How We Think* and Whitehead's *Science and the Modern World*. The comparatively low assessment by Scottish teachers is the first symptom of an apparent tendency in that group to give a relatively low rank to aims fostering initiative and originality on the part of the pupil and a relatively high rank to aims which imply an acceptance of things as they are such as " Obedience," " Inspection," "Examinations," and "Competition" (Aims Nos 20, 16, 15, and 11)

Aim No 8, " Activity," needs no special comment.

Aims Nos. 4 and 3, " Development " and " Expression," though similar in form, really express contrasting viewpoints, one starting from the teacher, the other from the child. Naturally, the former has been preferred by teachers.

The last three aims of this class have relatively low group assessments, but only Aim No. 7, " Equalizing Chances," was condemned with anything even remotely approaching unanimity. Both " Fact Assimilation " (which is based on Herbert Spencer) and " Formal Discipline " found in all four groups advocates who were prepared to give them B, and, very occasionally, A The assessors have, however, agreed fairly well in condemning Aim No 7 Several assessors protested against the inclusion of such an absurd aim. For a reasoned defence of it, supported by an impressive array of statistics, the reader may be referred to Bagley's *Determinism in Education.*

IV.—PREPARATORY AIMS AND THEIR ASSESSMENT.

The next class, the preparatory aims, has, on the whole, received considerably lower assessments than either the intellectual or the ethical aims, and from a theoretical point of view this is doubtless satisfactory. Aims included in this category are those regarded as more or less extraneously imposed

(11) (Competition . *Passim.*) To equip the child to compete more efficiently in the struggle for success in adult life.

(12) (Higher Stage . LORD E PERCY.) To prepare the child for a higher stage of education

(13) (Vocation DEWEY.) To prepare the child for some useful work after he leaves school and to give him initiative to seek out his proper sphere of work

(14) (Adult Life ' HERBART) To prepare the child for future life as an adult, teaching him the things which he will then approve, and neglecting where necessary present interests

(15) (Examinations FITCH) To prepare the child for his next important examination.

(16) (Inspection . LOWE and *Revised Code*) To prepare the class to make as good a showing as possible on the next visit of His Majesty's Inspector

TABLE II

ASSESSMENTS OF PREPARATORY AIMS.

Aim	*Gross Score.*	*Overall Assessment*	*English Teachers*			*Scottish Teachers*			*Educationalists*			*Students*		
			Total Score	*Group Assessment*	*Mean Variation*	*Total Score*	*Group Assessment*	*Mean Variation.*	*Total Score*	*Group Assessment*	*Mean Variation*	*Total Score*	*Group Assessment*	*Mean Variation*
(13) Vocation . . .	368	C	105	C	81	72	B	1·00	76	C	1·16	115	C	·90
(11) Competition	313	D	105	C	1·12	79	A	1·06	55	D	1·10	74	D	·94
(15) Examination . . .	239	D	50	E	1·22	67	C	1·27	45	D	1·16	77	D	1·04
(12) Higher Stage . . .	228	E	64	E	1·56	62	D	1·33	36	E	1·20	66	D	·88
(14) Adult Life	154	E	69	E	1·68	38	E	1·20	31	E	1·00	16	E	33
(16) Inspection . . .	128	E	25	E	51	56	D	1·80	19	E	·61	28	E	·58

Among these aims there is an extraordinarily close correspondence between the results for teachers in England, educationalists, and students. But Scottish teachers have given a relatively high assessment to aims in this class. In the case of Aim No. 15, however, this is probably due, in part, to differences in the educational systems of the two countries · some Scottish elementary pupils are presented for the Day School Certificates.

Aim No. 14, " Adult Life," which is based on Herbart (*The Science of Education*, tr Felkin, Sonnenschein and Co., p. 109), was treated with withering contempt by students, and received from them the most unanimous condemnation given by any group (M.V. = 33).

Aim No. 13, " Vocation," and Aim No 11, " Competition," were inserted partly in order to test a statement of John Dewey (*School and Society*, March 24th, 1917): " So far as such a training (traditional education) concerns itself with what is called vocational guidance, it will conceive guidance as a method of placement—a method of finding jobs (i.e , Aim No 11, ' Competition ') . . The other idea of industrial education aims at preparing every individual to render service of a useful sort to the community, while at the same time it equips him to secure by his own initiative whatever place his natural capacities fit him for (i.e , Aim No. 13, ' Vocation '). It will proceed in an opposite way in every respect." The results do not appear to bear out Dewey's contention that the more selfish aim is still preferred—certainly not in the theoretical world. Indeed, there seems to be little admiration for vocational education of any kind.

The comments on Aim No. 16, " Inspection," were more enlightening than the actual results. To teachers in England, students, and educationalists, the aim was anathema—as one lady put it: " I consider this question most insulting." Scottish teachers, on the other hand, disagreed about the value of the aim to a marked extent. And one Scottish H.M.I. qualified his assessment of D with the comment that if the inspector was one of the right sort the aim should receive an A.

The results for this whole class are evidence, though based on small numbers, of keener competition in Scotland, a competition operating through examinations, and possibly fostered by inspection.

V.—Ethical aims and their assessment.

Below are given the ethical aims, twelve in number :

(2) (Leisure : Aristotle.) To develop in the child the capacity for employing his leisure in fitting pursuits.

(17) (Ideals : *B of E. Handbook.*) To arouse an abiding interest in the great achievements which men have made in the past and the great ideals which stimulate them at present.

(18) (Character : Kant, Pestalozzi, and B. Russell.) To train the child to be persevering, brave, honest, and kind.

(19) (Emotions : *B. of E. Handbook.*) To train the emotions of the child (e.g., by helping him to appreciate art and music).

(20) (Obedience : Bagley.) To make the child obedient and respectful.

(21) (Religion : *Church of England Catechism.*) To teach the child to do his duty towards God and his neighbour.

(22) (Social Self : Dewey.) To enable the child to form a new social self through working and learning with others and overcoming obstacles in common with them.

(23) (Citizenship : Plato.) To prepare the child to be a more efficient citizen when he becomes an adult.

(24) (Self-Government : Dewey and J. H Simpson.) To train the child in the art of self-government through taking an active part in the life of the school.

(25) (Fuller Life : Dewey.) To give the child an opportunity for a richer and fuller life than is possible in the normal home.

(26) (*Esprit de Corps : B. of E. Handbook.*) To develop a sense of loyalty and fair play towards the other members of the school community.

(27) (Meaning : Dewey and Maxwell Garnett.) To help the child to see the true value and meaning of his life and work in society and to take an intelligent part in modifying society where necessary.

TABLE III.

ASSESSMENTS OF ETHICAL AIMS.

Aim	*Gross Score*	*Overall Assessment*	*English Teachers*			*Scottish Teachers*			*Educationalists*			*Students*		
			Total Score.	*Group Assessment*	*Mean Variation*	*Total Score*	*Group Assessment*	*Mean Variation*	*Total Score*	*Group Assessment*	*Mean Variation*	*Total Score*	*Group Assessment*	*Mean Variation*
(26) *Esprit de Corps*	429	A	131	A	78	89	A	·89	89	B	·90	120	C	·87
(18) Character	419	A	131	A	·80	89	A	93	91	A	81	108	C	1·06
(2) Leisure	417	B	124	B	72	74	B	93	84	B	1·10	135	B	50
(24) Self-Government	403	B	109	C	1·02	67	C	·96	82	B	1·00	145	A	90
(22) Social Self	379	B	110	B	1·00	54	D	1·50	88	B	·81	127	B	1·00
(23) Citizenship	370	C	119	B	85	72	B	·93	77	C	·77	102	D	1·35
(25) Fuller Life	370	C	96	C	·88	55	D	1·33	90	A	1·06	129	B	77
(19) *Emotions*	365	C	90	D	1·39	51	D	1·10	82	B	·84	142	B	·77
(17) Ideals	358	C	89	D	1·27	55	D	1·13	95	A	·97	119	C	85
(21) Religion	343	D	118	B	1·22	71	C	1·37	60	D	1·35	94	D	1·29
(27) *Meaning*	319	D	89	D	1·51	40	E	1·40	60	D	1·39	130	B	1·06
(20) Obedience	257	D	84	D	1·58	74	B	1·33	41	D	1·03	58	E	1·21

It is remarkable that Aim No 26, "*Esprit de Corps*," should have been assessed so highly It would probably win the approval of the authors of the Board's *Handbook*, but it is, in the opinion of the writer, a much less worthy aim than Aim No. 18, "Character" In the actual ratings, however, there is no significant difference

Aim No. 18, "Character," received rather severe treatment at the hands of the students. Their comments indicated that they considered it impracticable; yet it appears to include most of the qualities comprised by the first branch of the *Handbook's* statement of the school's paramount aim. "*To form and strengthen the character* and to develop the intelligence of the children entrusted to it."

Some well-known writers have said that our schools aim at blind obedience rather than initiative, but the results for Aims No 24, "Self-Government," and Aim No. 20, "Obedience," do not bear this out At least, it seems that teachers do not consciously give a high rank to obedience Scottish teachers are a marked exception

There was more disagreement *between* the different classes over Aim No. 25, "Fuller Life," than over any other in the questionnaire, although the disagreement *within* the classes (as shown by the mean variations) was by no means exceptional. The aim is based on the philosophy of Dewey, though the phrasing may appear a trifle condensed: "To give the child an opportunity for a richer and fuller life than is possible in the normal home" The terms are somewhat unhappy and possibly the divergence between the results for the different groups is due to the fact that the underlying conception was familiar to the educationalists and students, while the practical teachers were puzzled by the terminology. At any rate, several complaints were made about the language in which the aim was couched

Aim No. 19, "Emotions." There is apparently a clear-cut distinction between the practitioners and the other assessors over the feasibility and desirability of æsthetic training in an elementary school Some teachers thought it undesirable, others ineffective Yet the Board's *Handbook* regards emotional training as a necessary complement of intellectual work—presumably of equal importance.

Aim No. 21, "Religion" According to the *Handbook*, "religious teaching can and ought to play the supreme part in training mind, personality, and character." Teachers, however, found Aim No 21 only moderately practicable, while the other assessors ranked it lower still

Aim No 17, "Ideals," was drawn almost verbatim from Herbart, and proved unexpectedly popular with educationalists Students showed a preference for Aim No. 27, "Meaning." The latter's purport comes from Maxwell Garnett's *Education and World Citizenship*, and the low ranking given to it by the first three groups was a revelation to the writer To quote one assessor who marked it E, "I know my own limitations."[1]

VI—"AVERAGES" FOR THE THREE CLASSES OF AIM

Below are given the "Averages" for the different classes of aims. These were calculated from the total scores for the different groups Thus the mean total score for intellectual aims for teachers in England was 104 This was divided by the number of these teachers 104 ÷ 41 =2.54, which, according to our scale of marking, corresponds to an assessment somewhere between B and C (It will be remembered that for an assessment of B we gave three marks, and for C two marks) The last column was calculated from the gross scores, not by summation of group averages.

TABLE IV

AVERAGE MARKS FOR THE THREE CLASSES OF AIM

Class of Aims	*Group of Assessors*				*Overall Average*
	English Teachers	*Scottish Teachers*	*Educationalists*	*Students*	
Intellectual .	2·54	2·00	2·19	2·39	2·32
Preparatory . .	1·71	2·07	1·42	1·31	1·59
Ethical . .	2·61	2·20	2·52	2·44	2·46

VII.—MANUAL TRAINING AIM AND ITS ASSESSMENT

The last aim was "Manual Training," which falls in a class by itself. It comes from the Board's *Handbook*. "The school must encourage to the utmost the children's natural activities of hand and eye by suitable *forms of practical work and manual instruction*" The results, however, show only moderate enthusiasm for the aim in question Few of the teachers were in fact teaching manual work as a special subject, but the directions required the assessor to assume that he was teaching every subject to a thirteen-year-old class in an elementary school, and the assessments of practical importance were to be on that basis

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[1] The results for the inspectors who answered the questionnaire may deserve comment In their returns these inspectors gave a high proportion of A's and B's, in three cases extraordinarily high If this fact is significant (only six inspectors answered), it would indicate that their work renders inspectors prone to approve aims which are placed *before them theoretically That is, provided an aim is* passable, an inspector will not frown upon it.

The aim, with its group scores, is given below "Averages" are also quoted, rendering the results readily comparable with those for the three main classes

(28) (Manual. *B of E, Handbook*) To encourage and develop the child's natural activities of hand and eve by practical work and manual instruction

TABLE V.

ASSESSMENTS OF MANUAL TRAINING AIM

	English Teachers	*Scottish Teachers*	*Educationalists*	*Students*	*Overall*
Total Score	105	78	73	120	376
Average Mark .. .	2 56	2 6	2·36	2·5	2·51

VIII.—CORRELATION BETWEEN SCORES OF THE FOUR CATEGORIES OF ASSESSORS

Appended is a table of correlation coefficients. As one would expect, results for Scottish teachers correlate more highly with those for teachers in England than with those for either educationalists or students (although some of the educationalists worked in Scotland). On the other hand, there is a surprisingly high correlation between results for educationalists and for teachers in England.

TABLE VI

CORRELATION COEFFICIENTS

(Calculated by correlating scores assigned to the same aims by different groups of assessors)

	English Teachers	*Scottish Teachers*	*Educationalists*	*Students.*
English Teachers . .	—	·72	82	·52
Scottish Teachers . .	·72	—	·51	·49
Educationalists .	82	51	—	·87
Students	·52	49	·87	—

IX.—CONCLUSIONS AND SUMMARY

(1) A questionnaire on educational aims and their practicability produced 150 answers from four categories of assessors, (*a*) school-teachers in England, (*b*) school-teachers in Scotland, (*c*) "educationalists," i.e., persons professionally concerned with education though not school-teachers, and (*d*) students at the completion of their training course in a university training department.

(2) When these aims were grouped as intellectual, preparatory, or ethical respectively, it was found that the highest assessment was given to ethical aims. Intellectual aims were ranked only a little lower. Preparatory aims, in which the educative process is subordinated to some end external to itself, received much lower assessments except from teachers in Scotland, whose order was (1) Ethical, (2) Preparatory, (3) Intellectual.

(3) Inside each category of assessors there was great divergence of assessment For about one-third of the aims, the mean variation within each category was so great as to indicate almost complete disagreement.

(4) Between the average assessments of the different categories of assessors, fairly high correlations were found, ranging from 0·49 to 0·87. The mean of these correlations was 0 66

(5) Except for the apparently less idealistic attitude of the Scottish teachers, there was no marked tendency towards divergence of aims between the school-teachers and the other assessors.

(6) One aim which the school-teachers ranked much lower than the other assessors was "Emotional Training."

(7) The highest mark for any aim was given to "Observation." This suggests that a belief in faculty psychology is still prevalent "Formal Discipline," however, received very low marks as an aim; i.e, where faculty psychology shows itself nakedly, it is recognized and condemned.

(8) Inspectors answering the questionnaire tended to give high marks to a larger number of aims than any other assessors. But they were too few in number for safe generalization to be made on this point.

RÉSUMÉ.

UNE ENQUÊTE SUR LA VALEUR PRATIQUE DE CERTAINS BUTS PÉDAGOGIQUES TYPIQUES

Une liste de 28 buts pédagogiques, puisée surtout dans " le Manuel de Conseils à l'Usage des Instituteurs " du Board of Education, et dans les œuvres d'écrivains pédagogiques influents, fut soumise (a) à des instituteurs en Angleterre, (b) à des instituteurs en Ecosse, (c) à des personnes en dehors de l'enseignement, mais responsables de l'organisation des écoles, ou de la préparation des instituteurs, (d) à des étudiants à la fin de leur période de préparation professionnelle.

On leur demanda de classer les buts selon leur importance pour l'enseignement même L'on découvrit des divergences importantes dans chaque groupe de juges, mais il n'y avait aucune séparation marquée entre les practiciens et les autres Les buts éthiques furent classés un peu plus hauts que les intellectuels. Les buts qui attribuent à l'éducation un caractère préparatoire, et qui dirigent le processus pédagogique vers quelque fin extérieure reçoivent une note basse de tous les groupes de juges, sauf des instituteurs en Ecosse.

ZUSAMMENFASSUNG

EINE UNTERSUCHUNG BETREFFEND DIE ZWECKMÄSSIGKEIT TYPISCHER ERZIEHUNGSZIELE.

Eine Liste von 28 Erziehungszielen, die grösstenteils dem Handbuch der Anregungen für Lehrer, herausgegeben von der englischen Erziehungsbehörde, oder einflussreichen pädagogischen Schriftstellern entlehnt worden sind, wurde (a) Lehrern in England; (b) Lehrern in Schottland; (c) Leuten, die zwar nicht unterrichteten aber für die Organisation von Schulen oder für die Lehrerausbildung verantwortlich sind, (d) Studenten am Schluss ihrer fachlichen Lehrerausbildung gegeben. Sie wurden gebeten, die Ziele nach ihrer Bedeutung im Unterricht zu ordnen. Man fand, dass die Bewertungen in jeder Gruppe von Beurteilern stark voneinander abwichen; aber es bestand kein ausgesprochener Unterschied zwischen Praktikern und anderen. Ethische Ziele wurden etwas höher als geistige bewertet Ziele, die die Erziehung als vorbereitend ansehen und die das Erziehungsverfahren einem " ausseren Zweck unterwerfen, erhielten nur wenige Punkte von allen Gruppen von Befragten ausser von Lehrern in Schottland.

THE BEGINNING OF REFERENCE TO PAST AND FUTURE IN A CHILD'S SPEECH.[1]

BY M M LEWIS

I.—*Introduction.*

II.—*The freeing of language from dominance by the immediate situation.*

III.—*Functions of the child's earlier undifferentiated speech*

IV.—*Reference to absent situations* ·

- (*a*) *Response to adult reference* ,
- (*b*) *Rudimentary reference in the child's own speech.*

V —*The growth of linguistic intercourse.*

VI.—*Linguistic intercourse*

- (*a*) *With reference to the present situation* ,
- (*b*) *With reference to an absent situation.*

VII.—*Gradual nature of this advance.*

VIII.—*The development of reference to the past.*

IX.—*The development of reference to the future.*

X.—*Conclusion.*

XI.—*Summaries of observations.*

I.—INTRODUCTION

IN this paper I propose to deal with the way in which reference to the past and to the future come to be differentiated in the early stages of a child's adoption of conventional language

It is a surprising fact that this is a topic on which hitherto very little work has been done. There has been much discussion of the manner in which the child acquires grammatical forms—the parts of speech, for instance, or past and future tenses. But only very recently, with the growth of general interest in the functions of language, has any attention been paid to the occurrence of these functions in the life of the child. We can observe this change of emphasis if we compare earlier work like that of Stern (*1*) with the more recent work of Charlotte Bühler (*2*). Where Stern deals almost exclusively with the appearance of grammatical forms such as the parts of speech, the sentence and the subordinate clause, Bühler is concerned rather with the occurrence of such functions as narration and explanation. But even Bühler, I think, omits to consider the origin and growth of these functions, in relation to the child's earlier linguistic development. This is a question, I suggest, well worthy of study; and in this paper I am making an attempt to indicate how two of these functions—reference to the past and to the future—may begin to arise.

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[1] A paper summarised at the meeting of the British Association, Section J, Blackpool, 1936

II.—THE FREEING OF LANGUAGE FROM DOMINANCE BY THE IMMEDIATE SITUATION.

Reference to the past and to the future are two aspects of one very great advance in the life of the child. At first his language is exclusively concerned with the immediate situation in which it is spoken, then gradually it begins to be freed from the dominance of this present situation—he begins to deal with things that are absent. Perhaps the most striking instance of this greater freedom occurs when he spontaneously begins to speak of the past, to narrate. Karl Bühler and Charlotte Bühler have both emphasized the importance of this step. The latter tells us (2, p 148) of their daughter Inge that when she was just eighteen months old she said, on being brought back one day from a walk, *daten lalala*, she had seen some soldiers singing in the street (soldaten lalala)

I do not think there can be any doubt about the importance of this new development in a child's life What I am very doubtful about, however, is whether it is, as Charlotte Buhler seems to suggest, a sudden step. I shall try to show that this advance must be studied in the light of other aspects of the child's linguistic development: that reference to the past and reference to the future emerge side by side, and are due very largely to social influence, particularly as this is exerted when he takes part in linguistic intercourse with those around him.

To study this—or in fact any aspect of linguistic development—we need detailed observations of a child, showing not only what he said on successive occasions, but what was happening when he spoke But since earlier observers, as I have said, have been more concerned with form than with function, published observations of this kind are lacking I shall, therefore, confine myself to showing what occurred in the case of a boy, K, whom I had the opportunity of observing constantly throughout his first three years. Examples of my observations are given in the series at the end of this paper.

In his case the first clear instance of spontaneous narration occurred some six months later than that of Inge Bühler. At 2; 0, 20 (Series III), on being brought back from a walk, he was evidently trying to recount what he had seen: *mɔuka*[1], he said, several times. His father asked,

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[1] The records of K are given in the script of the International Phonetic Association.

motor-car? He said *nou*, and repeated *mouka* Then his father thought of *moo-cow*, and said this, the child replied, with evident satisfaction, *muka*

Now my observations of this child show that, so far from this being a sudden advance, it takes its due place in an ordered series of gradual steps in which we may trace his progress from his earliest attempts at conventional speech. This progress I shall attempt briefly to describe

III.—FUNCTIONS OF THE CHILD'S EARLIER UNDIFFERENTIATED SPEECH.

If we observe children before they acquire conventional language, and while they are beginning to acquire it, we find that they use speech in three different ways. (*a*) in accompaniment to an act, (*b*) declaratively; (*c*) manipulatively. By accompaniment I mean this while performing some movement the child utters a word which does not appear to refer to the situation in any way, but has become through training linked up with the situation, and is indeed an intrinsic part of the performance of the movement.

> Thus K, in his fourteenth month (1, 1, 8), having learnt to cover his head when his mother said *Peep-bo*, repeated the action spontaneously six times, saying *ebo* each time Next day when his mother playfully held a cloth in front of his father's face, the child pulled it away, saying *ebo*, and again later he seized a shawl, put it on his head, and said *ebo*

By declarative speech I mean the child's use of a word merely to draw the attention of others to some object, as for instance when K in his nineteenth month (1; 6, 11), said *tila* pointing to a picture of a watch And by manipulative speech I mean the child's use of a word not only to draw our attention to an object, but by way of demanding that we shall satisfy his needs in relation to that object; for instance, K in his nineteenth month (1, 6, 9) reached up towards a drawer in which chocolate was kept and said *goga*

Now it is reasonable to call the declarative and the manipulative uses of language *instrumental*, language in these cases is a social instrument by means of which the child draws others into his circle of activity And it is very important to recognize this instrumental function of speech, for we find that the clue to the growth of reference to the past and future lies in this, that it grows directly out of the child's instrumental use of language. In his efforts to satisfy his needs, he refers at first only to the situation actually present, then he begins to refer to situations which are absent Finally, under the stress of adult influence in linguistic intercourse, this reference to absent situations begins to be differentiated into reference to the past and to the future.

Thus we have to consider four phases of his development: first, the beginning of reference to absent situations; second, the growth of linguistic intercourse; third, the growth of reference to the past; fourth, the growth of reference to the future.

IV.—REFERENCE TO ABSENT SITUATIONS

In considering first the beginning of reference to absent situations, we have to notice that this occurs in the child's response to what others say to him as well as in his own speech.

(a) *Response to adult reference.*—When adults speak to the child, they constantly make reference to absent objects, a process which, of course, inevitably has its effect upon the child's own use of speech. In the case of K, the first instance of this kind which I observed occurred at 1 ; 1, 5 (Series I). The child had, since his tenth month, regularly responded to the phrase *Where's ballie?* by touching or grasping a ball lying before him. On the occasion in question, at 1 ; 1, 5, when the ball was out of sight, the adult's remark had still the same effect of inciting the child to act; and this activity involved an absent object. An exactly similar instance occurred at 1 ; 3, 5 (Series I). Now, as I have tried to show elsewhere (*3*, pp. 150, 304), reference of this kind to an absent object named by others does not suddenly appear fully-fledged in the course of the child's development. It is a slow process, arising at first from the child's concern with the situation present before him, and constantly determined by this interest, the need to act in the present situation. The child's response to *ballie* or *apple* is far from being a simple link between an object and a name. For even when the ball or apple is present, we find that the child's response to *Where's ballie?* or *Where's apple?* is at first not so much a direction of attention towards the particular object as the initiation of an act which involves this object. The adult's remark incites the child to perform a particular act. Now when the adult says *ballie* or *apple* in the absence of the object, the child is again put into a state of readiness to perform the act, and looks round for the object which is essential to its performance.

But while the child's early response in such cases is not simply reference to an absent object but largely a concern with the situation actually before him, there is no doubt that it is out of such a response that reference to absent objects ultimately develops. For this to occur, two factors are necessary, the intervention of another speaker, and the pressure of the child's needs with regard to the situation actually present

(*b*) *Rudimentary reference to absent objects in the child's own speech.*—We find these two factors also essential in the growth of the child's own spoken reference to absent objects the child's need to deal with a situation and the co-operation of another speaker in helping him to do so In the speech of K, the first instance of any reference to an absent object occurred at 1, 4, 17 (Series I): at breakfast the child turned towards the cupboard where honey was usually kept and said *ha*—a demand to be given the honey which was not yet before him At 1; 5, 22 again, he caught at his father's coat and tried to get at his watch-pocket, saying urgently *tɪk, tɪk*, at 1, 6, 9, he crawled towards the bureau where chocolate was usually kept, and reached up to the drawer, saying *gɔga, gɔga.* All these are cases in which the child is using words manipulatively, in the effort to draw attention to an object which he wishes to be brought into the present situation. And in all these cases it is clear that the child's utterance is much more an expression of his needs within the present situation than any reference to an absent object

But all the time, reference to absent objects is undoubtedly growing, being continually fostered by what the adult does in response to the child's remarks. If when he says *tɪk tɪk* we show him the watch, or give him chocolate when he says *gɔga*, we are clearly aiding the process of reference to the absent object An instance of the kind of advance that may be made is seen in my example from K's record at 1, 6, 13—four days after the last one given above (Series I) Here when the child was given a banana, he waved this aside and demanded *gɔga, gɔga*, although neither the time nor the place was normally associated with the eating of chocolate.

These then are the elements out of which reference by the child to absent objects, either in the speech of others or in his own speech, will grow. He responds by acts to the speech of others, and they respond by their acts to his speech But now a much more potent factor enters, which greatly hastens the whole process the adult engages in conversation with the child.

V.—THE GROWTH OF LINGUISTIC INTERCOURSE.

In the case of K, this very important development took place at about the age of 1, 6—the child began to respond to speech by speech. How did this occur? Throughout the child's experience, the adult comes before him as a being who both acts and speaks, at first the child responds only by acting and making his own primitive sounds, and gradually these sounds develop into speech, so that at last the child responds to the adult's acts and speech by speaking as well as acting When this occurs, so that the child is responding by speech to speech, language has begun to be freed for him from the dominance of the present situation.

In the case of K we can trace three stages in this development·

(1) (Earliest months) the child responds to the adult's *acts* by *acts* and some utterance of sounds
(2) (Towards the end of the first year) the child responds to the adult's *speech* by *acts*, and to his *acts* by *speech*
(3) (About 1, 6) the child responds to the adult's *speech* by *speech*.

In this third stage, with which we are here concerned, we can notice two successive phases: the child responds by speech to speech, at first in the *presence* of the situation referred to, later, in the *absence* of that situation

VI.—LINGUISTIC INTERCOURSE.

(*a*) *With reference to the present situation*.—Early examples of the former of these two phases, in the case of K, are given in Series II At 1, 5, 10—the first case noted by me—it is the child who speaks first, and the adult then incites him to further speech. At 1, 6, 3, we have an interesting case. the child's remark *ba*—of the kind that he frequently made in accompaniment to an act—is given by the adult's question something of a more definite direction towards a coming situation. At 1; 6, 9, we have a case in which the child is incited to manipulative speech: his mother says *I've got something nice for you*, to which he replies, *goga*—an expression of his desire to secure the object, and at 1, 6, 16, we have an example of declarative speech when the child is asked *What can you see*? and replies *fafa*, by which he draws attention to the flowers and perhaps expresses his delight in them. In all these cases a striking thing has happened· the child has at last shown that he understands the speech of others, not merely by performing some act, but actually by answering in words He has entered upon what is perhaps the most distinctive feature of his human heritage—conversation

Yet striking as this conquest undoubtedly is, we must recognize that it is in no sense a sudden change in the child's behaviour Until this moment the child has frequently used these kinds of speech either spontaneously or in response to another's acts· now he begins to use them in response to another's words. But there is no sudden change from one stage to the next For when linguistic intercourse begins, it is not that the child replies simply by speech to speech , it is rather that he responds by speech and acts to speech and acts Thus in the case at 1 ; 6, 3, it was the circumstances of the situation, as well as the remarks and gestures of the adult, which incited the child to say *ba* while he was walking to the bathroom So also in the two subsequent instances

In none of these cases is it true to say that the adult's remark evoked speech which otherwise would not have occurred, it is rather that the child would very likely have spoken in any case, because of the circumstances of the situation, and that the adult's remark made this more certain But in saying this we must be careful not to minimize the decisive part played by the adult in inciting the child to speak. We must remember that all through the child's history the speech of those around him is peculiarly directed towards evoking from him not merely a response, but a *spoken* response The importance of this in securing imitation by the child is already well recognized , but I do not think sufficient attention has hitherto been given to its function in arousing the child to a spoken response to the meaning of what he hears. The adult, by gestures and intonation, continually incites the child to speak, and encourages him with signs of approval when he has spoken. The resulting linguistic intercourse is without doubt the most powerful of all the means by which the society around the child fosters his advance in the mastery of language. For through conversation, more than any other factor, the child is helped to free his speech from the dominance of the present situation

(*b*) *Intercourse with reference to an absent situation*—We see how this may come about if we look at the two instances at 1 , 9, 2 and at 1 , 10, 15 (Series IV). In the former instance the child begins by rattling at the door and clamouring *ti* *ti* . and *aɪ-ɪ* *aɪ-ɪ* .—this we may regard as speech with a manipulative intention, called forth by the facts of the situation · it is the time of day when Eileen customarily appears with tea for the child's mother and a biscuit for him, and he is demanding that she shall now appear. But now when the adult asks . *What will Eileen bring us* ? and the child replies *ti* , this word takes on something of a forward-looking reference—it refers to the coming of Eileen , and clearly it is the adult's question which has suggested this forward direction to the child

A similar development occurs in the second case. The child is clamouring *houm, houm*, but one need not suppose that there is in this much, if any, forward-looking reference to the child's home—it is rather that he wishes his carriage to be turned and wheeled homewards, very much as has occurred on previous occasions when an adult with him has said *Now it's time to go home*. But now when the adult asks *Whom do you want to see?* and the child replies *gam*, there cannot, I think, be any doubt that there must be some forward-looking reference to the absent person, a reference that we may call manipulative because it is a demand that something shall be done for the child with regard to this person. And again it is reasonable to say that this forward-looking attitude has been suggested by the incentive of the adult's speech

In both those cases, it is clear, there were already the rudiments of reference to an absent situation before this occurred in response to the adult's remark: the child said *ai-i* : and *houm* spontaneously Rudimentary spontaneous reference to absent situations was, in fact, characteristic of K throughout the first three-quarters of his second year, as we have already seen illustrated in Series I Nevertheless, it is evident that adult speech plays a leading part in the further development of this reference. Adult speech makes reference to absent situations incomparably more definite: for the adult's question is a means of drawing the child's attention to the absent situation, while at the same time it incites him—by intonation and gesture—to speak Thus, much more certainly than ever before, the child's attention to absent situations will tend to be accompanied by his utterance of appropriate words, and the more that absent situations become linked up with words, the easier does it become to attend to them. In this way, it also becomes possible for the child to attend to remoter and remoter objects, for while his own rudimentary reference to absent objects arises almost inevitably from his needs with regard to a present situation, the adult in conversation may lead him further and further away from what is actually present Further, the adult's remarks give a *direction* to the child's reference to what is absent, the child comes to learn that under certain conditions, a particular manner, gesture, intonation of the adult means recall of the past or anticipation of the future. And finally, something will be due to imitation As the child realizes that the adult does refer to the past or the future, he too will come to do so more frequently, and linguistic intercourse of this kind will make him more aware of what may have been dawning upon him (but if so, dawning very dimly) that just as words enable him to deal with a present situation by calling in social aid, so they may help him to deal with absent situations.

Before we consider the details of this development, we must notice the relations between the stage already reached and the child's earlier behaviour.

VII.—GRADUAL NATURE OF THIS ADVANCE

For striking as this advance may be—the beginning of linguistic intercourse in which both adult and child refer to an absent situation—here again we have to deny any sudden step From the time when the adult's remark first causes the child to speak with reference to the present situation, up to the advance which we are now discussing, a series of changes may be observed showing progressively a greater freeing of the child's speech from the dominance of the actual situation. Let us look at our examples. In our earlier instances in Series III, at 1 , 6, 3 and 1 , 6, 9 the child's reply *bɑ* or *gɔga* is still very much determined by the facts of the present situation , this situation including, let us observe, not only the child's physical environment and the adult's acts, but also the features of the adult's speech—its intonation, rhythm, and stress At the same time, in saying *gɔga* the child is in a rudimentary fashion certainly referring to the absent chocolate And as we pass to subsequent observations, we find that the child's response is determined to a smaller and smaller extent by the characteristics of the actual situation, and that more and more the effect of the adult's remark is to direct the child's attention and speech to what is absent. Thus in our case at 1 , 9, 2 (Series IV), there is still no doubt that the child's reply *ti* is determined in some measure by the customary features of the present situation, and even by the word *Eileen*, which under these conditions has frequently been linked for him with the word *ti* :. In our next case, at 1 , 9, 9, the dominance of the present situation is clearly less, though still powerful , the child's reply *bɑ ti* still being determined in some measure by the customary features of the situation At the same time the forward reference is correspondingly clearer, as may be seen by the child's behaviour in tugging at the dressing-gown—he is looking forward to seeing his father shave

Two cases in Series III show this process advanced a stage further. At 1 , 10, 13, we see that the *physical* features of the present situation have ceased to be dominant although its *verbal* features may still influence the child's reply. Thus, while the child's reply is almost pure reference to an absent situation, yet the word he uses, *gæmi*, may perhaps be partly evoked by the word *cakes* with which it has probably been linked in the past And when we come to the case at 1 ; 11, 2, there seems nothing at all in the adult's remark to evoke any particular word from the child . there is not even the incentive of a question addressed to him. When, therefore, the child says *bʌti* and *gɔgi* he is really joining in conversation intelligently, with clear reference to the past

We see then how, by a series of small steps, the child's reference to absent situations is progressively freed from the dominance of the present situation, and that a decisive factor in this progress is provided by the incentive of linguistic intercourse with others We have still to see how this reference becomes specifically directed to the past and to the future.

VIII —THE DEVELOPMENT OF REFERENCE TO THE PAST

The primary effects of linguistic intercourse in fostering the child's reference to the past is, I think, this · it directs his attention to a past event and at the same time evokes from him words which were uttered at the time of that past event Take, for instance, our first case, at 1 , 8, 22 (Series III). A conversation is going on between adult and child , when the former asks, *Where's Da gone ?* the child replies, more or less meaningfully, *gɔ*: The adult pursues the topic and asks, *Where ?* to which the child replies, with rather less meaning, *da* The adult's third question, *Yes, but where ?* does at last evoke an answer, *ku l* (school), which can be regarded as meaningful , but it is clear that no hard-and-fast line can be drawn between this and the two earlier replies In all three cases, the intonation and gestures of the adult suggest to the child the utterance of a vocal response, and what the child then says is called forth partly by the form of the adult's words at this moment and partly by recall of what had on the past occasion been spoken by adult or child. It is reasonable to suppose that in this instance the adult had previously said *Da has gone to school*, and it is not unlikely that the child had imitated this immediately. When, therefore, the adult subsequently says *Where's Da gone ?* he is to a very large extent evoking from the child the word *school* which he had previously heard, and perhaps even said

I have analysed this case at some length because it brings out a point which, I think, may sometimes be neglected that linguistic intercourse between adult and child, even though it is meaningful, does at the same time evoke from the child responses which are at the verbal level and to that extent meaningless. When, for instance, K at 1 ; 8, 25, said *dæda* in reply to *Who gave you that box ?* or at 1 , 10, 13, *gæni* in reply to *Who made the cakes for you ?*, it is clear that the connection between *box* and *dæda* and between *cakes* and *gæni* had more likely than not been established on the past occasion, so that the adult's words now were evoking something of that verbal connection. We must not, in fact, make too sharp a distinction in the child's linguistic development between meaningful and meaningless utterance.

At the same time it would be false to minimize the fact that, in the instances we have just considered, the child makes a true reference to the past *The adult, in the very act of reinstating a verbal connection* made in the past, is thereby also recalling for the child the circumstances of that past event. So that when the child says *ku . l* or *dæda* or *gæm* he may reasonably be regarded as referring to the event which the adult has mentioned. As I have pointed out above, the child's speech is first freed from the dominance of the physical features of the present situation, then from the dominance of its verbal features, so that in our case at 1 ; 11, 2, we seem at last to have true reference to a past event

With the next cases in our series, 2 , 0, 20, and 2 , 0, 22, we come to a *further stage in the process : spontaneous reference to the past*— on his return from a walk the child, for instance, spontaneously says *mɔuka* Without much doubt, he is recalling the exciting experience just past, and with it the word uttered *then*, either by him or the maid, or both This utterance is spontaneous, but the part that may be played by the adult in fostering such utterance is seen in the conversation that immediately follows The adult questions the child, with two effects on the one hand, he helps to make the child's utterance more precise and bring it nearer to conventional adult speech , on the other hand, he *shows an interest in the child's reference to the past and so incites the* child to further behaviour of this kind It is hardly necessary to emphasize how much difference it would make to the child's speech about the past events if his remarks continually failed to arouse any interested response from those about him

IX —THE DEVELOPMENT OF REFERENCE TO THE FUTURE.

Just as in the growth of reference to the past, the child's reference *to the future is determined by the behaviour of adults in linguistic* intercourse with him It is, of course, true that the rudiments of reference to the future exist in the child's speech long before he engages in any linguistic intercourse, but I do not think there can be any doubt that it is this latter activity which gives his rudimentary future reference the definiteness which it comes to have in conventional speech In the case of K, the first glimmer of future reference in response to an adult occurs at 1 ; 6, 3, but his first clear spontaneous future reference not until 2 , 1, 23 (see Series IV)

The general development of reference to the future seems to be as follows Much of the child's speech, precisely because it is manipulative, and directed towards securing the satisfaction of needs, has from an early period something of a forward-looking direction. The adult, by questions and remarks, frequently incites the child to refer to his needs, and thus to make a manipulative reference to the future , and sometimes also incites him, by speaking of future events which resemble past experiences, to make a purely descriptive or declarative reference to these events. Ultimately, the child comes to refer to the future quite spontaneously.

Let us take a few landmarks in the progress of K At 1 , 6, 3 we saw, he says the word *ba* while marching towards the bathroom, when he is asked, *Where are you going?* Here the adult's question gives the child's reply a glimmer of forward direction , a function which, in our next case at 1 ; 8, 24, has become rather more definite When the child says *gɔga*, he certainly expresses his need within the present situation, and possibly refers to something beyond it. It is the adult who makes this reference more specific by replying *When we go out*, for the child's immediate response *tata* unquestionably refers to the future

It is important to notice that this reference to the future is made possible because the future resembles the past, and that the child's replies at this stage are determined by past occasions. Thus the remark *When we go out* recalls to the child occasions of going out, and it is this recall, as well as the need for chocolate, which evokes from him the reply *tata*. For some time in the child's development this effect of the past remains an important factor, as may be seen from our examples at 1 ; 11, 9, and 2 , 0, 10 In the former case, when the child is asked *What is Baby going to have for breakfast?* and replies *agu*, the adult has helped the child to recall breakfast ; so too in the second case when the adult says *I must take you to have your hair cut* and the child replies *ʃɪʒɪʒ*. Observations such as these make it reasonable to suppose that at this early stage the direction of the child's reference—whether to past or to future—is indefinite, and that at first he refers, and is helped to refer, to an absent situation, rather than to a definitely past or future one. We find two things helping to give this reference a forward-looking direction : first, the pressure of the child's own needs, secondly the influence of others in linguistic intercourse with him.

The observations before us give us a glimpse of the manner in which these factors work. The child's reply becomes progressively less dependent upon the actual physical conditions of the present situation or upon the verbal form of the adult's remarks. Thus at 1 , 8, 24, the phrase *when we go out* almost inevitably suggests the reply *tata*, but at 1 ; 11, 9, *breakfast* rather less necessarily suggests *agu*, and at 2 , 0, 10 *hair cut* even less necessarily *ʃɪʒɪʒ* In all these cases we see that the child's speech is freeing itself from the dominance of the present and is being given a future direction by the pressure of his needs . *tata*, *agu*, and *ʃɪʒɪʒ* all express, with varying degrees of urgency, his desire to secure satisfactions to come, or at least to communicate his feelings about them.

This is the personal factor, proceeding from the child himself , but no less important, I think, is the social factor, the pressure that is exercised upon the child from without Each of these acts of linguistic intercourse is *followed* by the event to which it refers ; and this the child must come to realize. He must realize also that a certain intonation and manner when the adult speaks signify the future In this way, the adult does much to give the linguistic act a twist in the future direction.

Gradually, with the concurrence of these two factors, the personal and the social, there comes a time when the child refers to the future, in almost complete independence of present circumstances. Thus at 2 ; 0, 16, when K's father says *I must get up*, his response *pu dædɪ, bæŋkets of* is almost a spontaneous expression of his intention , five weeks later, at 2 , 1, 23, the final stage is reached on hearing a story the child remarks, without any incentive from an adult, [K] *tell ɪt nau*—a completely spontaneous reference to the future

Thus from the stage when a child first begins to make some slight reference to an absent situation because this is bound up with his present needs, we find the adult progressively intensifying and clarifying the child's reference to the future, so that at last this is made spontaneously and with increasing awareness that it is the future that is referred to

X.—CONCLUSION.

In this brief survey I have tried to show by considering the facts of one child's development, how unlikely it is that the occurrence of reference to the past or to the future is a sudden event in a child's life I suggest instead that it arises as the result of a number of factors, of which the most important are the child's own manipulative and declarative needs in speaking, and the influence of adult reference to past and future in linguistic intercourse It is this last factor above all which I should like to stress, not because I consider it the most important—this is difficult to estimate—but because it has hitherto been so much neglected In a recent very interesting paper, Sauvageot(*4*) has suggested that the notion of tense—past, present, and future—may differ according to the linguistic community, being closely bound up with the means of linguistic expression · and may therefore be less fully developed in speakers of

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Slavonic languages than among Western Europeans. The account I have here given of the one child observed by me suggests that in the development of children's speech the factor of social intercourse may similarly play a decisive part, helping to make reference to the past and to the future the very definite functions with which we are familiar in our everyday language.

XI.—Summaries of observations

Note.—A=adult, C=child, F=father, M=mother

SERIES I.

RUDIMENTARY REFERENCE TO ABSENT OBJECTS.

Age	*Circumstances*	*Adult's Speech.*	*Child's Speech*	*Conventional Equivalent*
1, 1, 5	C playing with toy, has not played with ball all day, at this moment it is lying in corner of room, in shadow M says . . . . C turns round and crawls towards ball. On the way he halts at the coal-box, a favourite plaything When M repeats phrase C resumes journey, seizes ball, and looks at M	Baby, where's ballie ?		
1, 3, 5	C has been nibbling an apple while crawling about on the floor, and has thrown it into a corner M does not know this, and asks the question Whereupon C crawls straight towards the apple and brings it to her	Where's apple ?		
1 4, 17	At breakfast-time, turning towards the cupboard where the honey, which he generally has at breakfast, is kept, says		ha	Honey
1, 5, 22	F sitting down C spontaneously comes over to him, seizes lapels of coat, and tries to push them apart, saying		tik, tik	Tick, tick
1 6, 9	C crawls over to bureau, reaches up to drawer where chocolate is kept, and says . .		goga, goga	Chocolate
1, 6, 13	At dinner C is offered a banana He waves this away, and says . .		goga, goga	Chocolate

SERIES II.

BEGINNING OF LINGUISTIC INTERCOURSE.

Age.	*Circumstances.*	*Adult's Speech.*	*Child's Speech*	*Conventional Equivalent.*
1, 5, 10	M dressing C in front of gas-fire. C points to fire and says in a delighted tone		aha, fa.	Aha; fire.
	M asks, pointing to fire	What's that?		
	C replies		fa.	Fire.
1; 6, 3	About bath-time C climbs upstairs, M following him. At the landing she asks	Where are you going?		
	C makes straight for bathroom, saying		ba.	Bath.
1; 6, 9	Standing by bureau in which chocolate is kept, M says	I've got something nice for you.		
	C replies		gɔga, gɔga.	Chocolate.
1; 6, 16	M wheels C's carriage towards bed of tulips and asks	What can you see?	fa, fa.	Flower.

Continued in Series III and IV.

SERIES III.

GROWTH OF REFERENCE TO THE PAST

Age.	*Circumstances.*	*Adult's Speech.*	*Child's Speech*	*Conventional Equivalent.*
1; 8, 22	Conversation between A and C ...	Where's Da gone? Where? Yes, but where?	gɔ dɑ kuːl.	Gone. Da. School.
1; 8, 25	M, finding C with box which F had given him, asks	Who gave you that box?	dæda.	Dadda
1; 10, 13	F, referring to cake in C's hand....	Who made the cakes for you?	gæni.	Granny.
1, 11, 2	M, speaking to A, trying to recall name of people met nearly a month before, when C had been present.... C, who is listening, says	What was the name of those people?	bʌti, gɔgi.	Bertie, doggie.
2, 0, 20	On his return from a walk with the maid, says .... F asks .... F asks again	Motor-car? Moo-cow?	mɔukɑ. nou mukɑ.	No! Moo-cow!
2; 0, 22	Picking up a book which he had lost the previous day, and which Da had found, says		da faind it	Da find it.

SERIES IV
GROWTH OF REFERENCE TO THE FUTURE

Age	*Circumstances*	*Adult's Speech*	*Child's Speech*	*Conventional Equivalent.*
1, 6, 3	About bath-time C climbs upstairs, M following him At the landing she asks . C makes straight for the bathroom, saying	Where are you going ?	*ba*,	Bath
1, 8, 24	C speaking to M, says appealingly M replies . . . . C says	When we go out	goga tata	Chocolate Tata.
1, 9, 2	Early in the morning in M's room C goes to door, rattles the handle and says . Then adds M asks M continues	What will E bring us ? What else will E bring us ?	tɪ tɪ ai-i ai-ɪ' tɪ bɪkɪ	Tea Eileen Tea Biscuits
1, 9, 9	In the morning C sees F getting out of bed, F asks C goes to where F's dressing-gown is and pulls it over to F	Where's Daddy going ?	*ba* tɪ	Bathroom
1, 10, 15	M wheeling C in carriage C says M asks	Whom do you want to see ?	houm gæni	Home Granny
1, 11, 9	Before breakfast M asks . . .	What is baby going to have for breakfast ?	agu	Egg
2, 0, 10	M addressing child .	I must take you to have your hair cut	ʃɪʒ ɪʒ	Scissors
2, 0, 16	F, in bed, says C (immediately) .	I must get up	pu dædɪ, bæŋkets ɔf	Pull Daddy (out of bed, and) blankets off
2, 1, 23	M has told him a story After hearing it three times he says .		(K) tel ɪt nau	(K) tell it now

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Résumé.

L'ORIGINE DU RAPPORT AU PASSÉ ET À L'AVENIR DANS LA LANGUE D'UN ENFANT

Bien qu'on ait consacré assez d'attention à la manière dont les formes grammaticales se manifestent dans la langue d'un enfant, l'on ne s'est guère occupé de la façon dont se distinguent des fonctions nouvelles Dans l'étude actuelle l'on examine des séries d'observations faites sur un seul enfant, et, dans ce cas, l'on démontre que le rapport au passé et à l'avenir se développe de la manière suivante comme résultat de l'influence des relations sociales sur les besoins de l'enfant

1 —(a) De bonne heure les besoins de l'enfant l'obligent à faire dans sa langue des allusions élémentaires à des objets absents , (b) il répond aussi par ses actions à des allusions faites par d'autres à des objets absents

2 —Les rapports de langage commencent , l'enfant apprend à répondre à la parole par la parole

3.—Des personnes qui parlent à l'enfant feront constamment allusion à quelque événement passé , et les mots adressés à l'enfant, et son propre souvenir de l'événement passé contribueront à évoquer de lui une observation , une telle conversation arrivera peu à peu à se rapporter définitivement au passé

4 —Les besoins de l'enfant forcera ses actions et le langage qui les accompagne à se diriger vers l'avenir

5 —Enfin l'enfant arrivera à se rapporter spontanément au passé et à l'avenir

Zusammenfassung

ERST ANSÄTZE ZUR ERWÄHNUNG VON VERGANGENHEIT UND ZUKUNFT IN DER KINDESSPRACHE

Obgleich man der Art, in der grammatische Formen in der Kindessprache entstehen, sehr viel Beachtung geschenkt hat, ist über die Unterscheidung neuer Funktionen wenig berichtet worden In diesem Artikel werden Reihenfolgen von Beachtungen eines besonderen Kindes untersucht, und hier wird es gezeigt, dass die Erwähnung der Vergangenheit und der Zukunft durch die Wirkung gesellschaftlichen Verkehrs auf die Bedurfnisse des Kindes entsteht wie folgt

(1) (a) Im frühen Kindesalter veranlassen seine Bedürfnisse das Kind in seiner Sprache abwesende Gegenstände rudimentär zu erwähnen , (b) es reagiert auch durch seine Handlung auf die von anderen gemachten Erwähnung abwesender Gegenstände

(2) Anfang sprachlichen Umgangs das Kind lernt mit Sprache auf Sprache zu reagieren

(3) Leute, die das Kind anreden, erwähnen beständig irgend ein Ereignis der Vergangenheit, und sowohl die zu dem Kinde gesprochenen Worte als auch seine Erinnerung an das vergangene Ereignis pflegen es zum Sprechen zu veranlassen Derartige Sprache wird sich allmählich entschieden auf Vergangenes beziehen.

(4) Die Bedürfnisse des Kindes bewirken, dass seine Tätigkeiten und die begleitende Rede vorausgerichtet sind, wenn in einem solchen Augenblick jemand das Kind anredet, wird seine Antwort sich meistens entschiedener auf die Zukunft beziehen

(5) Schliesslich wird das Kind dazu kommen, sich auf die Vergangenheit und die Zukunft zu beziehen.

A CRITICAL SURVEY OF OBJECTIVE ESTIMATES IN THE TEACHING OF ENGLISH.

By DOROTHY BAGLEY

Part I

I —*Introduction.*
II —*Development of power of expression*
III —*Reading*
    (*a*) *Psychology*
    (*b*) *Teaching methods*
    (*c*) *Backwardness in reading*
    (*d*) *Comprehension* (*of material read silently*).
IV —*Literature*
    (*a*) *Curriculum and method*
    (*b*) *Psychology of literary appreciation*

I —Introduction

The term " objective " is here applied to studies in which the experimenter has attempted to eliminate, or to reduce to a minimum, any influence which his own prejudices or predilections may have had upon the evidence collected during the experiment and upon his interpretation of that evidence Objective studies in the teaching of English include three types of investigation ·

(*a*) The " observation " or " scientific report " type, which aims at collecting faithfully all the material possible by recording it verbatim, and draws its conclusions by scrutinizing this material, e g , Studies by Boyd and Drever, of the speech of young children ; by Betzner, of oral composition of young children.[1]

(*b*) The " classification " study For this, too, material is collected and the items are arranged in an order according to the frequency with which they occur, e.g , Thorndike's Teachers' Word Books ; Willing's analysis of errors made in language tests [2]

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(*c*) Objective experiment undertaken to measure, for example, the effect of a certain teaching method upon the progress of a class, or the extent to which a particular ability is involved in some task. Experimental conditions are so arranged that there shall be only one variable, namely, the method or stimulus, etc., which is being investigated In the most important of these experiments, method of procedure has become increasingly scientific Often three groups of pupils, " matched for intelligence and other traits relative to the activity under investigation,"[1] are used as experimental, control and check groups, the last of these being unaffected by special conditioning Time and duration of lessons and teacher personnel are carefully controlled, special tests evolved on the lesson material and the value of each test item weighted according to the results of a pre-testing of other parallel groups of children and often the final grading confirmed by an appeal to expert authority The conclusions drawn from the data obtained are limited to the age level of the pupils selected, and, even then, only if a sufficiently wide selection has been made Those experimenters who are most careful as to the technique of their work are the most guarded in the conclusions they draw. In assessing the value of results, it must be remembered that experimental conditions in a classroom are artificial and children are quick to sense this The personalities of the teacher and the children are intimately involved, and, where studies deal with the effect upon achievement of concentrated practice with a small amount of material over a certain space of time, the novelty of the procedure and the enthusiasm of the teacher are powerful stimulants to learning and results are probably inflated by them.

Most of the work of investigation in the teaching of English has been done in America Surveys of education in different States early emphasized the necessity of impersonal standards to make comparison possible between schools and schools and between State and State. Tests have been evolved and standardized, also scales for the rating of compositions. Together they cover the whole range of English work. The testing of attainment led to the consideration of the subject matter taught and its suitability, the method of presentation, and the psychological issues involved. In Reading and Spelling, where progress is comparatively easy to measure, investigation began about forty years ago, and there are now hundreds of American studies in these sections of English Most of the American experiments have been conducted on a large scale and many cover several grades (school standards) Huxtable's experiment in composition, for instance,[1] involved the choosing, from 29,000 submitted, of 1,200 compositions, 200 papers for each half grade of the Junior High School Results are naturally calculated in averages, and, while these are very useful in showing the general trend of achievement, they are apt to be misleading with respect to those sections of English work, such as composition and literary appreciation, which are most influenced by the creative personality of the pupil

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[1] HAZLITT, V *The Psychology of Infancy*, p. 7

It may be questioned whether the findings of American studies in the Teaching of English are applicable to conditions in this country It appears from these studies, however, that schemes of work are of the same nature as those in England, though some items are naturally different. Work of much the same difficulty is attempted at the various age levels The problems that face them are largely identical with our own American children make the same mistakes in punctuation, similar mistakes in language structure, and misunderstand in the same way as English children Important classification studies, such as Thorndike's Word Book, dealt with written literature and material common to both countries These and other studies dealing with the appropriateness of certain lesson substance to certain age levels and of particular teaching methods suggest that reconstruction in some directions would be advantageous

II.—DEVELOPMENT OF POWER OF EXPRESSION.

Some of the studies dealing with power of expression are concerned with its development while others are devoted to the discovery of "standard usage" The first embody the results of careful observation and record, they trace the growth of the oral vocabulary of individual children and groups of children and of the written vocabulary of still larger groups They record the changes of sentence structure exemplified in the written compositions of children of different ages and of adults. They provide the teacher with a standard to which her own observation of children may be referred, for they give information calculated from a wide sampling as to what we may reasonably expect from the "average" child at different age levels. From them we learn that though children acquire words very rapidly, they do not acquire all the parts of speech at the same time. The first use of personal pronouns, of the adverb of degree, of the subordinating conjunction, of a "logical 'since' and a logical 'because'," mark definite stages of mental growth It is suggested that environment, direction and development of interests, and stage of mental growth are three most potent factors influencing the formation of vocabulary Children of 5 to 8 years sometimes use as many as 1,000 words in an oral dictated composition The recognition vocabulary of children of 13—13½ is put at 7,000 words Growth of writing vocabulary, on the other hand, is very gradual It means "essentially the substitution of less common words in the first 500 (Thorndike List) or the employment of modifiers among the less common words which limit or describe the common words"[1] Level of intelligence is most influential in this development, and training is also very important

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[1] HUXTABLE, Z. L *Criteria for Judging Thought Content in Written English* — *Journal of Educational Research*, Vol. 19, pp 188-195.

Growth in the use of sentence structures is found in the steady increase in the proportion of complex sentences—"a mark of increasing maturity." The suggestion that its use is also a sign of superior intelligence is not proven."[2]

Studies of "usage" have been devoted to the calculation of the frequency with which each word occurs in written English and of the frequency of occurrence of the different parts of speech and the different kinds of sentences and constructions Personal achievement may thus be compared with standard usage The most common words have been distinguished and it is considered that children should be made acquainted with these first. The words of the Thorndike Word Book have been roughly apportioned to the grade levels of American schools The Faucett-Maki List,[3] which combines the words of the two most famous American lists, provides a useful means of checking a child's vocabulary and would be particularly useful in the case of the apparently backward child It would be reasonable, on the evidence of the studies of the language used by children, to expect the "average" child of 10+ (i e., having an I.Q. of 90 or over) to understand the 1534 "indispensable and essential" words of the Faucett-Maki List and the average child of 12 to be able to use most of them in writing. By 14 the pupil's vocabulary should include words of rating 100 (4,500 on the Thorndike List)

The word-lists are also used in America to evaluate text books there is, of course, a certain risk in accepting the frequency of usage of a word as its sole measure of importance and in the assumption that " a person increases his vocabulary by learning words roughly in the order of their frequency,"[1] for the evidence available in studies of children's vocabularies is not conclusive on this point

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[1] SYMONDS, P M, and LEE, B *Studies in the Learning of English Expression —Teachers' College Record*, Vol 31, pp 50–58 (Columbia University)

[2] KIMMINS, C W · *Methods of Expression used by London Children in Essay Writing at Different Ages —Journ of Exper Pedagogy*, 3, pp 289-295

FROGNER, E . *Problems of Sentence Structure in Pupils' Themes —English Journal*, Vol 22, No 9, p 742

[3] FAUCETT, L., and MAKI, ITSU *A Study of English Word Values* (Oxford University Press)

There has been little attempt to apply the data given in the studies of sentence structure to a teaching programme. It appears, however, that

(1) Practice with complex sentences (one main clause and one dependent clause of any type) may be given to 8-year-olds
(2) Practice with complex sentences containing more than one subordinate clause to children aged 10–11
(3) Later, say at the age of 13+, practice with constructions alternative to the clause—such as the infinitive, the gerund, and the participial phrase—would be profitable

Only two small studies bear witness to the efficacy of drill in increasing the vocabulary of pupils and in stimulating them to use as great a variety of sentence structure as possible

III —READING

(a) *Psychology.*

The scientific study of the visual mechanisms and of the nature of the perceptual process in reading, begun in the laboratories of Europe in the middle of the nineteenth century, has revealed the following facts

(1) Eye-movements in reading are discontinuous
(2) Reading takes place, not solely by letter or word-wholes, but rather by phrases, words, or letters, according to the reader's familiarity with the reading-matter and the difficulties he encounters, and, some would add, his purpose in reading
(3) In young children, " voluntary and reflex movements about the field of vision " are " in general inaccurate and erratic "[2] Corrective movements and constant fixation pauses are necessary and the eye is liable to wander. Eye movement is, in the case of good readers, habitually rhythmic, the forward movements alternating regularly with fixation pauses of comparatively short and regular duration The process is disturbed by " any species of mental struggle or conflict, whether in an effort to understand or to perform some difficult task " In such cases " periods of confusion " may supervene during which there is a " return to the irregular wandering eye-movement of childish reading "

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[1] THORNDIKE

[2] VERNON, M D. *The Experimental Study of Reading* (1931)

The greatest tendency to such impulses is manifested by those whose rate is most variable and most confused by regression.

(4) There is little, if any, decrease in the number of fixation pauses after the age of 9 or 10 years and not much decrease in the average duration

(5) Decrease in the number of regressions continues until 15 years of age and may continue to the adult stage. After 15, variations are probably due to factors other than maturity and practice in reading.

(6) Individuals vary enormously in their reading habits (in speed, accuracy, perception, and progress).[1]

(7) There is no definite experimental evidence as to how perception develops with sufficient detail and accuracy for reading purposes In adult reading, in general, only a small part of the visual field is actually perceived

(8) There is no definite evidence as to the influence of word meaning upon perception [2]

(9) All available evidence indicates a " close relationship between speed and comprehension "[3]

Some investigators (e.g , A. I Gates) stress the influence of the purpose of the reader upon the nature of the activity To them reading is not " a single unitary power "[4] but a name for a large number of abilities The distinctive techniques must be taught or many children will never develop them unaided and will not be able to vary their method when necessary.[4]

Considerable light has been thrown on the complex nature of the reading process by studies of reading disability Many investigators consider that General Intelligence is " the most important determinant of reading ability,"[5] for, although the co-efficients of correlation vary according to the Intelligence Tests used, they are uniformly high (·65 to ·84) Gates calls such tests " verbal tests " and quotes the co-efficient of correlation between reading scores and scores on a Non-verbal Test as ·20. (Another investigator gives the figure as 24 She used a different non-verbal test) Nevertheless Gates agrees that, among unselected children, backwardness in reading would probably be more frequently associated with low general mental ability than with any other single cause.[1] More recent research has established the existence of disability at any mental level [2]

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[1] Judd, C. H , and Buswell, G T : *Silent Reading —Supplementary Educational Monograph*, No. 23 (Chicago, 1922)

[2] Vernon Medical Research Council Report, 1929

Pyle : Medical Research Council Report, 1929

[3] Tinker, M A : *The Relation of Speed to Comprehension in Reading —School and Society*, July, 1932, p. 158

[4] Gates, A I , and Alstyne, D Van *The General and Specific Effects of Training in Reading with Observations on the Experimental Technique —Teachers' College Record*, Vol 25, p. 98

[5] Gray, W. S , The Twentieth Year Book of the National Society for the Study of Education, Part 2, 1919, p. 5

(*b*) *Teaching methods*

1.—It follows that good reading habits must be acquired early in life American experimenters suggest a mental age of 6⅓—6½ as the most satisfactory to begin learning to read. Studies in method offer evidence that the beginner will be likely to make rapid progress if.

(*a*) The desire to read arises naturally out of some activity.

(*b*) The material has meaning and interest for him

We do not know how the child recognizes words, possibly, as one expert suggests, he notices some minute detail in the contour. He therefore needs to become familiar with the words in various settings.

2.—Experimental evidence has been produced in favour of Phonic Analysis, the Look-and-Say and the Sentence Methods of teaching reading.[3] (These studies are all open to criticism with respect to experimental method) As words are primarily perceived as wholes, it would seem advisable to present them so at first. American investigators have found flash cards and more lengthy lantern exposures effective in focussing attention Phonic analysis should be postponed until the child is ready for it The teacher must apparently recognize the appointed time by observing the child It appears to demand a higher degree of intelligence than either the Look-and-Say or the Sentence methods, the value of the training is sometimes not apparent for five months or more [4]

3.—New words must not be presented too rapidly. There should be 30 or 40 familiar running words in Primary Readers for each new word introduced. Many repetitions are necessary, the lower the Intelligence Quotient the more practice will be needed

e g, I Q 120—129 Repetitions needed in reading material 20
I.Q 60— 69 ,, ,, ,, ,, ,, 55

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[1] GATES, A I *The Psychology of Reading and Spelling*—*Teachers' College Contributions to Education*, No 129, p 15

[2] MONROE, M *Children Who Cannot Read*—*Behaviour Research Fund Monograph* (University of Chicago, 1932.)

[3] GILL, E. J. *Methods of Teaching Reading*—*Journ of Exper. Pedagogy*, Vol 1, p 243

VALENTINE, C W *Journ of Exper Pedagogy*, Vol. 3, p 99, 1915

ZIRBES, L · *Comparative Studies of Current Practice in Reading*—*Teachers' College Contributions to Education*, No 316 (Columbia University, 1928)

[4] GRAY, W. S *Summary of Investigations Relating to Reading*—*Supplementary Educational Monographs*, No 28 (Chicago, 1925); and *Journal of Educational Research*, Vol 26, p 401, 1933

4.—Finger pointing should be discouraged as wrong eye-movements result from it. Correct movement may be stimulated by using passages in which the sentences are divided, by means of upright lines, into thought units which may be grasped as wholes[1] Some modern Readers provide such passages[2]

5—It is necessary to cultivate a wide eye-voice span, for, if it is narrow, vocalization begins before the meaning is understood. Constant regressions then become necessary and poor comprehension results. Oral reading in class should not be persisted in too long. Inner speech, accompanied by partial lip movement, also has a retarding effect It has been shown that practice will increase the silent reading speed of both children and adults.[3]

6—Each child should be helped to develop reading skill to the best of his ability, at his own rate, and, perhaps, in his own way.

Teaching method has, of recent years, been largely based upon these findings, with excellent results. The busy life of the kindergarten provides continual stimulation to the desire to read, while reading books are interesting, for they tell of the doings of small children and their relations with mother, father, friends, and pets

(c) *Backwardness in Reading*

It has been found that defects in reading ability result from:

Lack of visual discrimination.
Auditory difficulty
Lack of motor control
Conceptual weakness.
Over-emphasis in training
Environment.
Emotional disturbance

Such causes do not occur singly but combine in each single case to produce backwardness and disability.[4] Careful investigation is needed to locate the specific causes, and practice exercises should be given to combat the weakness This should, if possible, be done in school, to avoid giving the child the impression that he is a "special" case[1] A number of studies report that specialized training has resulted in improvement along specific lines A special method is in use in a Los Angeles centre, in dealing with "hopeless" cases who seem incapable of associating meaning with words seen with the eye The child traces the outlines of whole words, one by one, on the blackboard. In this way a recognition vocabulary is painfully built up by motor-association, and then suddenly the power of reading is acquired after the lapse of, sometimes three months, sometimes twelve[2]

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[1] GATES, A I · *Interest and Ability in Reading* (1930)

[2] e g, *The Beacon Readers* (Ginn and Co)

[3] SCHMIDT, W A *An Experimental Study in the Psychology of Reading—Supplementary Educational Monograph*, Vol 1, No 2 (Chicago, 1917)
O'BRIEN, J A *Silent Reading*. (1921.)
VALENTINE, C W *Some Experiments on the Speed of Reading and its Improvement—Forum of Education*, Vol 1, p 222. (1923)

[4] HUME, E G *A Study of Backwardness in Reading among Elementary School Children—M.A Thesis* (University of London 1926)
MONROE, M. *Children Who Cannot Read* (Chicago, 1932)
FRANK, H. *A Comparative Study of Children who are Backward in Reading, and Beginners in the Infant School.—Brit. Journ of Educ Psych.*, Vol 5, Part 1, p 41. (1935)

In America, standardized reading tests are used in diagnosis, and also to test progress Tests available in England are those of Dr Ballard,[3] Professor Burt,[4] and The Brighton Reading Tests[5]

(*d*) *Comprehension* (*of material read silently*)

Several interesting studies deal with the problem of comprehension, but, although their findings are suggestive and in harmony with experience, they cannot be accepted as experimentally proven, as the evidence is, so far, insufficient Seven investigators (two English)[6], dealing with the problem of literary appreciation, conclude that the chief stumbling-block for both children and students is inability to understand the meaning of what is read It is shown in a group of American studies that practice in tracing the main thought, and in finding the "topic" sentence of a prose passage, is valuable and also practice in test drill (with objective type tests) in poetry It is suggested that such special training should begin at the age of ten It is claimed, but not proven, that general comprehension of literature is increased thereby.

One American investigator[7] set out to discover the relative difficulty of different types of literary extracts for 9th grade pupils, aged about 14 He used four selections—two prose (one narrative), a poem, and a passage of dialogue from Shakespeare's "Julius Cæsar," the blank verse being printed as prose. These were chosen as possessing equal vocabulary difficulty Great care was taken in carrying out the experiment. Several interesting facts appear from the scores made on the various tests

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[1] GRAY, W S. *Improving Instruction in Reading —Supplementary Educational Monograph*, No 40 (Chicago, 1933.)

[2] TERMAN *The Most Dramatic Thing in Education To-day —*(*To-day*, October 17th, 1986 Summarized in *The Reader's Digest*, November, 1936, p 91)

[3] BALLARD, P B *Norms of Performance in Reading —Journ of Exper. Pedagogy*, Vol 3, p 153 , and *Child Study*, Vol 9, No. 1

[4] BURT, C *Mental and Scholastic Tests.* (1921)

[5] *The Brighton Reading Tests* (University of London Press)

[6] RICHARDS, I A , *Practical Criticism.* (1928)
SUSSAMS, T W *Journal of Education* (1983)

[7] IRION, T W H · *Comprehension Difficulties of 9th Grade Students in the Study of Literature.—Teachers' College Contributions to Education*, No 189 (Columbia University, 1925)

(1) Pupils found it most difficult to grasp the general significance of the poetry, although they could deal with specific words and expressions.
(2) They found detailed comment difficult with the drama, though they grasped the broad significance of it easily enough
(3) The prose selections proved easiest to grasp.

Actually the poem and the dramatic dialogue presented peculiar difficulties, and it is obvious from this study that some other criterion of difficulty, besides vocabulary, is needed when choosing parallel selections Difficulty in the case of prose, when it exists, is likely to be of vocabulary and involved sentence structure , in the case of poetry and the drama it is commonly the unusual expression of the thought The findings of several studies emphasize the particular difficulty presented to children by the figurative language of poetry We may infer from all these studies that

(1) Poetry should be chosen of which the wording is well within the grasp of the child possessing the average class I Q
(2) Provided the plot is clear, a play will be understood by the " average " child, in spite of difficulty with some of the words

Irion found that (1) the word knowledge test was the best in determining the extent of reading comprehension ; (2) that intelligence was a most important factor in literary comprehension

He urged that more attention be given to the development of silent reading ability, as this is vital Other investigators agree with his statement that school programmes in literature are often beyond the capacity of most of the children and that more help is needed than is usually given

IV —THE TEACHING OF LITERATURE

(*a*) *Curriculum and Method*

Investigations in this subject are mostly American The earliest of these are concerned with children's reading interests and preferences. Other studies assess the difficulty of poems and other literary material[1]

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[1] CROW, C. S . *Evaluation of English Literature in the High School —Teachers' College Contributions to Education*, No. 141 (Columbia University, 1924)

CAVINS, L V *Standardisation of American Poetry for School Purposes* (1928)

THORNDIKE, E L . *Contributions from Child Psychology to Special Methods —Teachers' College Record.* (Columbia University, 1901)

KING, C E *Favourite Poems for Children of Elementary School Age —Teachers' College Record*, Vol 23 (Columbia University, 1922)

JORDAN, A. M *Children's Interests in Reading —Teachers' College Contributions to Education*, No. 107. (1921)

It is made clear that

(1) Complete stories, poems, and plays are studied with greater pleasure than short extracts.

(2) Up to the age of about 12 years, children like to read stories about other children and about animals. They prefer these to be realistic They also enjoy legends and vivid fantastic tales As they grow older, they enjoy human stories of home life and the adventures of real people gradually their interest shifts to the heroic and ideal Historical novels and those dealing with social problems appeal to them later

(3) Interest in poetry appears to increase from the age of 10. A detailed and careful study of the preferences in poetry of New York children Grades 1–9 in five elementary schools established·
   (*a*) That the range of interest was tremendous,
   (*b*) That the element of greatest consequence to the child is different from that of the adult

(4) All children whether dull or clever appreciate the story that is well told and prefer it to the story that is mediocre or badly told[1]

(5) Information available in English investigations is not very encouraging and the statements in them are sometimes too sweeping. Jones and Owen, who made an extensive enquiry into the tastes of Welsh boys in English literature, found that " the so-called classics—Scott, Kingsley, Dickens—make hardly any appeal to the average boy "[2] Sussams roundly declares that " boys have no natural interest in poetry Unless directly challenged, their attitude is one of indifference."[3] P. B. Ballard in England and A Abbott in America have also questioned whether poetic excellence makes any natural appeal to the race Maturity and experience are not sufficient aid in judging correctly. Children and adults who have had special training show to advantage in tests of literary appreciations[4]

Although the "classics" have not been graded scientifically, according to difficulty, in England, the curriculum in literature in the secondary school has, of late years, been changed in keeping with the growing knowledge of children's feelings about books, extracts are rarely set for close study nowadays

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[1] HUBER, M. B *Influence of Intelligence on Children's Reading Interests—Teachers' College Contributions to Education*, No 312 (Columbia University, 1928)

[2] LLOYD-JONES, J, and OWEN, E T *Books Children Like Best—Welsh Outlook* Press (1929)

[3] SUSSAMS, T W *Journal of Education* (May, 1935)

[4] BALLARD, P. B. *The Appreciation of Poetry—Journal of English Studies*, Vol I, No 2 (1912-13)

ABBOTT, A, and TRABUE, M R *A Measure of Ability to Judge Poetry.—Teachers' College Record*, Vol 22, p 101 (Columbia University, 1921)

The suggestion, in an American study, that a wider range of material for rapid reading should be offered to pupils,[1] led to an investigation of the comparative merits of intensive study and extensive reading (i.e., of six times as much of prose, poetry, and drama, in some way connected with the material set for examination) The most important study found in favour of the extensive type of training as being the more profitable of the two,[2] a finding endorsed by other studies. The evidence is not, however, sufficient or conclusive enough to warrant the indiscriminate use of planned programmes of extensive reading throughout the secondary school, the importance of age level and of intelligence has not, so far, been taken sufficiently into account

Another American teacher offers evidence of the appeal of modern poetry and suggests that a greater proportion should be included in the curriculum[3], the advice may be extended to include modern prose and drama

Four studies are concerned with learning poetry by heart Of these, two, English,[4] show that poems may be learnt as wholes " when they are easy to understand, have a good swing, and a binding thread throughout " Division, according to sense, is necessary when the material is difficult, not closely knit, and when the rhyme and rhythm are not obvious ; a third, American, that children are not naturally inclined to learn poetry by heart but have to be stimulated to do so.[5] Another study found that " training enlightened by principles " improved " ability to memorize poetry, prose, and other material " in the case of college students[6] Training of this kind can, with profit, be given to children in the literature lesson, that they may each acquire his/her own most economical method of learning.

Although there are countless articles on teaching method with respect to literature, there is very little indeed in the way of objective measurement One experiment with two small senior classes studying "Macbeth" found that class discussion directed by the teacher was a sounder procedure for examination purposes than "activities" controlled by the pupils themselves Objective type tests were used in the examination.[1] E Rickert describes a series of statistical and graphical devices to enable the student to grasp the thought, imagery, and the word-, rhythm-, and tone-patterns in poetry and prose, which have been tested out experimentally by her students Literature is here regarded simply as an arrangement of words.[2] Of these devices, the underlining of colour-words in the appropriate colour, the tracing of alliterative letters in colour, the pattern graphing of poetry and prose according to number of syllables and the graphing of poetry according to stress, are the most useful with children There is, however, insufficient proof, as yet, of pupils' improvement in literary appreciation as the result of training for us to be able to prove the value of our methods

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[1] Crow, C. S.

[2] Coryell, N G., *An Evaluation of Extensive and Intensive Teaching of Literature —Teachers' College Contributions to Education*, No 275 (Columbia University, 1927)

[3] Dithridge, R L *Do High School Students Like Modern Poetry ?—English Journal*, Vol 23, No 8 (October, 1934, p 664)

[4] Winch, H. H *Should Poems be Learnt by School Children as Wholes or in Parts ?—Brit Journ. of Psych*, Vol 15, p. 64

Sawdon, F W *Should Children learn Poems in " Wholes " or in " Parts "?—Forum of Education*, Vol 5, p 182.

[5] Frawley, H M *Certain Procedures of Studying Poetry in the 5th Grade Teachers' College Contributions to Education*, No 539 (Columbia University, 1932)

[6] Woodrow, H · *Effect of Type of Training upon Transference —Journal of Educational Psychology*, Vol 18, p 159

(*b*) *Psychology of Literary Appreciation.*

Most of the evidence available in objective estimates may be interpreted in support of the view that appreciation of literature is a double process, both the thought, or substance, and the manner of its expression being apprehended The immediate appeal of rhythm in poetry is made clear in certain studies, which report the reasons given by children and adults to justify their preferences and antipathies Abbott observed that children "prefer verses without subtlety, objective in mood, easy to understand and in simple, strongly marked rhythm"[3]—a fact to be remembered when choosing poetry for the junior school Where pupils appear to have no rhythmic sense, it seems likely that "sound imagery" or inner speech is indistinct vocalisation is a noticeable accompaniment of the learning process in their case There is some evidence that training makes pupils more sensitive to rhythm Visual imagery is useful to appreciation, especially of nature poetry, but appeal to it as part of teaching method must be sparing [4] Comprehension of subject matter is involved in the appreciation of poetry, prose, and drama It has been noticed that triviality of thought is often the reason given by a " testee " for rejecting a poem[1] The interdependence of rhythm and thought must be remembered in the poetry lesson Method should naturally vary according to the material, but, as a general rule, the rhythmic approach to the poem should come first, especially in the case of the lyric and ballad The general sense or substance of the poem will then be inferred before any discussion , good reading aloud is essential[2] Many poems require considerable discussion before the exact sense is grasped and procedure should be varied as much as possible. The poem should not be left there but a complete and richer impression of the whole obtained in a final reading, sometimes a choral reading in which the whole class takes part It is obvious that the child does not turn easily to the analysis of diction in poetry or prose " Speech is to him a medium through which he views the objective world and when it properly serves its purpose it becomes a transparent medium—one that fails to arrest his vision "[3]

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[1] Taggert, L, and Haefner, G E, *Two Methods of Teaching "Macbeth"*—*English Journal*, Vol 23, No 7, p 543

[2] Rickert, E, *New Methods for the Study of Literature* (Chicago, 1926)

[3] Abbott, A, *Teachers' College Record*, Vol 22, p 101

[4] Valentine, C W *The Function of Images in the Appreciation of Poetry*—*Brit Journ of Psych*, Vol 14, p 164

Peers, E Allison, *Imagery in Imaginative Literature*—*Journal of Exper Pedagogy*, Vol II, pp 174 and 261

Jenkin, A, M *Imagery and Learning*—*M A. Thesis* (University of London, 1930)

Farrar, D H *Images and Literary Imagery.*—*Ph D Thesis* (University of London, 1931)

Power of appreciation must necessarily be influenced by other abilities Since comprehension of subject matter is involved, intelligence must have considerable influence but, if we accept objective estimates of this, it is not as great as one would expect. Carroll and Speer found that it was important in the estimation of the value of prose extracts[4] Irion found that knowledge of vocabulary, which seems to be closely associated with level of intelligence, affected the power to profit by the study of literature[5] Speer, who concluded, in his study, that the social background of the child had no significant effect upon the power to appreciate, was dealing with comparatively young children Vocabulary is affected by environment, and so are the amount and type of reading material available, social conversation, and experience, all of which react upon critical ability in older children He also found that there did not appear to be " a general artistic ability " in the case of his pupils (there being little connection between the appreciation of poetry and the appreciation of art) and power of appreciation had little connection with composition ability Another English study found that, with college students, æsthetic sensibility with regard to poetry has close relation to verbal ability—as judged by scores made on sentence-meaning, word-meaning, opposites, and completion tests[1] It is true, also, that children who write good verse and good compositions are usually appreciative S Alexander laid particular stress upon the constructive nature of the æsthetic impulse[2] Pupils enjoy the activity of play reading and acting but it seems that activity is pleasant for its own sake It is suggested, moreover, that the reader re-creates in a lesser degree the imaginative process of the artist This necessitates a " putting-forth " of imaginative sensibility and we appreciate according to the measure of our success in doing this " The moment that can be truly described as æsthetic is a moment of contemplation—receptivity rather than one of critical analysis It holds the thrill of immediate response to the artist's mood." The determining factors of this complex process have not been isolated for experimental purposes and we have no standard tests to measure them.

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[1] Fox, C *Practical Psychology* (1928)

[2] Wheeler, O A · *An Analysis of Literary Appreciation*—*Brit. Journ of Psych* , Vol 19, p 229

[3] Ballard, P B · *Thought and Language*, p 93.

[4] Carroll, H A *Appreciation of Literature and Abstract Intelligence*—*Journ of Educational Psychology*, Vol 25, p 54

Speer, R R. , *Measurement of Appreciation in Poetry, Prose, and Art, and Studies in Appreciation*—*Teachers' College Contributions to Education*, No 362 (Columbia University, 1929.)

[5] Irion, T. W. H · *Teachers' College Contributions to Education*, No 189

" Recognition of merit does not guarantee appreciation but it is basically essential to appreciation on the higher levels."[3] Tests of literary appreciation are largely tests of judgment. Some require the placing of extracts in order of merit[4], others deal with certain elements of appreciation, such as response to the visual and auditory suggestion of words and phrases, or to the subtleties of metre[5] The successful performance of these appears to depend mostly upon training[6] The most natural judgment of the child is to say " I like it " " The work pleases the individual or satisfies him, but has value only in so far as it satisfies a standard mind."[7] The task of the teacher is to make clear the standard value of a work and the reasons for that value, so that in time the pupil may make a true judgment unaided Training in the understanding of the thought and in the appreciation of technical excellence in poetry and prose contribute towards that end.

(To be continued)

(Résumés in French and German will be given at the end of Part II in the next number.)

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[1] LEOPOLD, K *The Effect of Creative Work on Æsthetic Appreciation. An Experiment in the Teaching of Poetry*—*M A Thesis* (University of London, 1930) — *Brit Journ of Educ Psych*, Vol 3, Part I, p 42. (1933)

[2] ALEXANDER, S. *Beauty and other Forms of Value*, p. 16.

[3] SPEER

[4] BALLARD *The Appreciation of Poetry*—*Journal of English Studies*, Vol 1, No 2

[5] LOGASA, H, and WRIGHT, M McCOY. *Tests for the Appreciation of Literature* (Public School Publishing Co, Illinois)

[6] HOWELLS, T H, and JOHNSON, A A · *A Study of Metre-Sense in Poetry*—*Journal of Applied Psychology*, Vol. 15, p 539.

[7] ALEXANDER, S. *Beauty and other Forms of Value*, p 27.

A STUDY OF THE NORMS AND THE VALIDITY OF CERTAIN MENTAL TESTS AT A CHILD GUIDANCE CLINIC.*

PART I.

By P. E VERNON
(Jordanhill Training Centre).

I —*Introduction*
II.—*The Burt-Stanford-Binet test.*
III —*Performance tests*
IV —*Mare and foal test*
V —*Ship test.*

I.—INTRODUCTION

MANY decisions of vital importance to the welfare of thousands of children are nowadays being based upon the findings of psychologists attached to child guidance clinics And these findings rest very largely on the presumed accuracy of certain indispensable psychometric tools such as the Binet scale, performance and educational tests Practising psychologists realize, however, that their tests are defective in many ways, especially at the upper age levels On the basis of their working experience they often formulate for themselves rough notions as to what the tests measure, where they are most untrustworthy, and so on. These notions are obviously subjective and unreliable, but how can more accurate information be obtained? A few detailed investigations have been carried out such as Burt's[1], Gaw's[2], Earle and Milner's[3], and Alexander's[4] in this country, and several other less accessible studies have been published in America But such research is as rare as it is valuable, both owing to lack of financial resources and because of the almost insuperable difficulty of securing large, representative samples of the normal population above the primary school age.

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* I am indebted to Dr E Mapother, Medical Superintendent of the Maudsley Hospital, for permission to make use in this article of data collected while I was on the staff of the Children's Department at the Hospital, also to Dr E M Creak, Miss N Samuel and other members of the Department for their assistance in obtaining the data and for their comments on my results, to Miss Fildes, Miss E. P. Stevenson, Miss M Leiper, Drs C J C Earl and L S Penrose, the Rector of Harris Academy, and others who gave information about their own researches; and finally to the Managers of the Pinsent-Darwin Studentship in Mental Pathology, the work being carried out during my tenure of the studentship —P E.V

[1] BURT, C *Mental and Scholastic Tests* (London King, 1921, pp 432)

[2] GAW, F. *Performance Tests of Intelligence—Industrial Fatigue Research Board Report*, No. 31 (London H. M Stationery Office, 1925, pp 45)
—— *Performance Tests of Intelligence—British Journal of Psychology*, Vol. XV, 1925, pp 374–392

[3] EARLE, F M, MILNER, M., et al *The Use of Performance Tests of Intelligence in Vocational Guidance—Industrial Fatigue Research Board Report*, No 53 (London H M Stationery Office, 1929, pp 69.)

[4] ALEXANDER, W P. *Intelligence, Concrete and Abstract—British Journal of Psychology*. (Monograph Supplement, No XIX, 1935, pp 177)

Yet there exists a mine of information which has hitherto been but little exploited, namely the files which contain the results of routine testing at clinics Every year at least ten thousand Binet tests and an incalculable number of performance and educational tests are applied by trained psychologists Admittedly the value of such data is limited by the fact that they are obtained from subjects who are emotionally, and often intellectually, subnormal Nevertheless there are many ways in which a checking up of our records might show more definitely where some of the main inadequacies lie, and where improvements may be effected. The following observations are the products of such a check-up on the tests that have been used most frequently by the present writer at the Maudsley Hospital, London The material is too limited to provide a basis for many practical advances, still less for conclusions of importance to general psychological theory But by comparing the results with the results of other investigators it may be possible to bring out certain characteristics of these tests in clinical practice, and to suggest methods for extending some of them up to higher age levels, where so few good individual tests are available It is hoped also that this study may stimulate others to look into their records in an attempt to disinter material that may be of value to all who are concerned with mental measurement and psycho-diagnosis.

II —THE BURT-STANFORD-BINET TEST

Burt's restandardization of the Stanford-Binet scale is probably the most accurate version available for children of 5 to 12 years, but as it has never been published in full[1], it is only used by a limited number of clinics The ordinary translated version of the Stanford-Binet scale is quite unstandardized in this country, and Burt's work shows that many of its items are considerably misplaced Still less adequate is the twenty year old restandardization by Burt of the Binet scale, given in his *Mental and Scholastic Tests* The Burt-Stanford version, however, becomes manifestly more and more unsatisfactory among older subjects. Many of the "adult" tests are either too childish or too lengthy to apply, and omitting them reduces the discriminative power of the scale Some of them are certainly misplaced, i e , they are standardized too high or too low relative to the rest[1]. The scoring varies among different clinics, in what the writer believes to be the authentic version, the maximum obtainable M A is 18 years, but in other versions the maximum is 19 6, as in Terman's scale. Some follow Terman also in using 16 years as denominator for calculating adult I.Q.'s, though the majority seem to realize that a denominator of 14 years is slightly less unsatisfactory

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[1] An outline appears in *The Subnormal Mind*, Oxford University Press, 1935 But even here the age placements of the tests are not the same as those used at many clinics

The so-called upper limit of intellectual growth is still a controversial question. Some tests certainly show small increases in average scores for age groups above 14, but probably different tests reach their constant level at different ages We have no right to assume that ability at any test increases linearly up to a certain age and then remains stationary till senility, its growth is much more likely to tail off gradually In fact the whole conception of mental ages and intelligence quotients above, say, 12 years seems to cause more trouble than it is worth, though it is now so firmly entrenched and so convenient below 12 that we are reluctant to discard it above this level. It might be wiser to follow Thurstone's suggestion[2], by setting up separate percentile or T-score norms for each C A. level from 12 to 20, and for both sexes

Even with a 14 years denominator the maximum possible Binet I Q. is much too low, namely 129 (or 139 if Terman's method of scoring is used) And the maximum M.A of 18 (or 19 · 6) is scarcely ever attained even by superior adults, since they frequently fail on either code, seven digits backward, reversed triangle or ingenuity The scale does contain items sufficiently difficult to give some differentiation between persons who are likely to possess I Q 's of 140 and 150, but at present it assigns them I Q 's of about 123 and 129 In other words an I Q of over 100 in a subject aged 14 or over at present merely shows that he is above average, but gives very little notion as to how much above average It certainly does not indicate approximately the same degree of superiority as it would in a child aged 10 years.

Several pieces of evidence for this stricture may be mentioned. First the writer has tested a number of persons with university education who were believed to have I Q.'s of about 140, both on account of their performance in group tests such as Cattell's Scale III, and by deductions from tables of occupational norms of intelligence But their

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[1] This has been shown by Mrs Elvin and Miss Fildes, who have plotted the percentages of passes on each test among a thousand subjects.

[2] THURSTONE, L. L *The Mental Age Concept.—Psychological Review*, Vol XXXIII, 1926, pp 216–227

Binet I Q's were only about 120 Secondly Freeman, Holzinger and Mitchell[1] and others have demonstrated the existence of a negative correlation between Terman I.Q and C.A of – 21 ± 05 to – 28 ± 02 Thirdly the same decrease of I Q with C A is shown in the following table of results collected at the Maudsley Hospital. This is based on a thousand cases tested by Miss N. Samuel or by the writer between 1932–35 They are an unselected sample of the clinic population, except for the omission of all cases presumed to be psychotic, of certain others who were grossly unco-operative, and of those defectives whose I Q 's fell below 55. The standard errors of the averages are appended. As a further check on their reliability, Miss Samuel's and the writer's averages for successive age groups were compared, they showed a mean difference of 2 95 points (regardless of sign). But the mean σ difference was 3 80, and none of the differences were statistically significant

Here the inverse correlation between I Q and C A is – 20 ± 02, but this figure probably represents a greater decrease than Freeman's

TABLE I

C A Group	*N*	*Mean I Q*	*σ Mean*
3 0–5 0	47	98 08	2 00
6+	71	98 10	2·26
7+	70	98·93	1·94
8+	73	96 51	1·81
9+	81	96 67	1 57
10+	87	96 09	1 72
11+	83	94 16	1 58
12+	86	92 04	1 61
13+	96	90 15	1·46
14+	83	90 60	1 53
15+	70	91 49	1 51
16+ and adult	153	90 33	1 13
	1000		

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[1] FREEMAN, F N , HOLZINGER, K J , and MITCHELL, B C *The Influence of Environment on the Intelligence, School Achievement and Conduct of Foster Children — XXVII Year Book of the National Society for the Study of Education*, 1928, pp 103–217

– ·28, quoted above, since he would have used a 16 year denominator for his adult I.Q.'s. How far then is the decrease due to curtailment of the upper I.Q. levels by the test itself, how far to the nature of the subjects tested? It is quite likely that the drop in average I.Q. at 8+ is occasioned by the cases of educational disability, who form a considerable proportion of the clinic population, for it is at 7 to 8 years that the Burt-Stanford scale begins to depend rather largely on reading ability. The further drop at 11 and 12+ may reflect the creaming of the brightest children into secondary or central schools. Such children are seldom referred to the clinic, whereas the senior schools continue to refer their emotional or educational problem cases. The major proportion of 14 and 15+ cases are delinquents. But usually the probation officers only bring the more complex and interesting adolescents, who often seem to be of superior intelligence, to the clinic, the rank and file are tested at the remand home. Hence we would hardly expect the average I.Q. at this age to be as low as 91. Among the adults are a large number of dull out- and in-patients, but this group also includes some paying patients and a few normal university undergraduates and graduates who are much above average. To conclude then, part but not all the decrease shown in Table I is likely to be due to the sampling of cases.

The curtailment of high I.Q.'s is also illustrated by the S.D. at different age levels. From 5 to 7+, σ I.Q. = 16·83, from 8 to 11+, 15·08; from 12 to 15+, 14·39, 16+ and over, 13·95. Among younger groups the dispersion is normal, but it is very low in the older groups.

Further evidence may be derived from the results of the Vocabulary test. Vocabulary shows a very high correlation with total Binet score. In a group of 445 unselected clinic cases a coefficient of + ·878 ± ·007 was found between Vocabulary and Binet I.Q.'s (C.A. being thus eliminated). This coefficient is, of course, somewhat spurious, since the Binet M.A.'s are themselves partly based on Vocabulary. But Vocabulary constitutes only about one-ninth of the total scale from 8 to 18 years, hence the correlation between it and the rest of the scale may be estimated at about + ·80. In spite of this close agreement, the writer has often noticed, in giving Binet to adolescents and adults, that their Vocabulary M.A.'s are higher than their Binet M.A.'s, and that the former appear to be nearer to their presumed real intellectual level.

Table II shows the Vocabulary scores, expressed in terms of M.A., for successive C.A. and Binet M.A. groups. The S.E.'s of these scores have not been calculated, but the Q.'s (i.e., the semi-interquartile ranges, which should approximate to the P.E.'s) average 12·3 per cent in the C.A., and 7·1 per cent in the M.A. groups. The average scores are therefore highly reliable.

It will be seen that Binet and Vocabulary M A 's correspond very closely in the 8+, 10+ and 11+ groups[1], but that above this level the

TABLE II.

C.A Group	*N*	*Vocabulary M.A*	*Binet M A Group*	*N*	*Vocabulary M A*
8+	45	8 42	8+	69	8 43
9+	65	9 17	9+	97	9 00
10+	68	10 15	10+	96	10 51
11+	63	11 28	11+	95	11 52
12+	78	11 81	12+	83	12 93
13+	75	12 36	13+	60	14·24
14+	57	13 58	14+	42	15 50
15+	57	13 69	15+	21	16 82
16+	24	13 92	16+	15	18 86
				578	
17+ and adult	56	14 69			
	588				

Binet M A falls progressively further behind the Vocabulary This result may be due partly to the increase of Vocabulary with C A , which doubtless continues much beyond 14 years Terman[2] found an average difference of 0·62 Vocabulary M.A years between adults and children of the same Binet M.A. from 9 to 15 and a larger discrepancy averaging 1 73 years between those of M.A 16 to 19. Our table indicates an increase of over a year (2 78 words in a list of 50 words) between 14+ and adulthood, though this is probably over-large because the adult group contained a considerable proportion of persons with university education But this factor is hardly adequate to account for the obtained difference between Binet and Vocabulary results Nor can we adduce as an explanation the well-known fact that abnormal persons tend to obtain higher scores on

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[1] No reason can be discovered to account for the discrepancy between Binet and Vocabulary in the 9+ M A group The average score was 12¼ words instead of the expected 13¾ words It is noteworthy, however, that in an investigation of the test by Terman, cited below, the score at 9 years was 2 1 per cent below the norms

[2] TERMAN, L M *The Vocabulary Test as a Measure of Intelligence*—*Journal of Educational Psychology*, Vol IX, 1918, pp 452–466

Vocabulary than on other mental tests (cf. Wells[1], Babcock[2], Simmins[3], Jastak[4]), since this would not produce a discrepancy that increases regularly with age. Hence if the Vocabulary test is well standardized, it follows that the Binet scale, at the ages of 12 or over, is standardized much too strictly

The unduly low I.Q level of the 306 subjects aged 14 or over (Table I), and these results with the Vocabulary test, suggest that the average Binet M A. of normal adults is not only far less than Terman's 16 years, but even a little less than 14 years. And other, more reliable, lines of evidence confirm the supposition In the course of the American army investigations[5], Stanford-Binet was applied to 653 English speaking white adults, who were described as " approximately unselected " Their average M A. was 13 . 5. Further indications may be derived from results with performance tests. Alexander's Passalong Test is probably well standardized in this country, yet it is shown below (Section IX) that subjects tested by the writer obtain Binet M A.'s somewhat lower than their Passalong M A 's Similarly Miss Leiper[6] tested 22 normal school-girls (11–14½ years) and found an average Binet I Q. of 92, Passalong I Q 98·5 In Alexander's research[7], his Group IV subjects, namely 100 delinquent women (16–20 years), obtained an average Binet M A of 13 5, Passalong M A , 14 11 It seems unlikely that in all these groups " concrete " intelligence should be much superior to " abstract " intelligence Finally, adult norms for the Moorrees Formboard (cf. Section X) have been constructed from external sources , 84 subjects of C.A. 14 or over whose Moorrees scores ranged round the average adult level obtained a mean Binet M.A. of 13 7.

Many of these deficiencies of the Stanford-Binet scale are already generally recognized. The conclusion is often drawn that the Binet test is inapplicable above, say, 14 years, and that some well standardized group test should be used instead But the disadvantages of using group tests for individual diagnosis are quite as great above 14 as below it Delinquent adolescents and mental hospital patients are as likely as problem children to be unco-operative. The scores obtained by such persons when they take group tests individually give the psychologist the minimum of information about their mental status Even when obtained under good conditions such scores are usually based on a very narrow sampling of the rich variety of intellectual functions, namely on verbal (and sometimes perceptual-spatial) reasoning By contrast the Binet test, together with some of the performance tests mentioned below, sample the mind much more broadly and so provide the psychologist with a fairly complete picture of the testee's intellectual and temperamental qualities, and also show him whether his conclusions must be distrusted on account of lack of co-operation

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[1] WELLS, F L , and KELLEY, C M · *Intelligence and Psychosis —American Journal of Insanity*, Vol. LXXVII, 1920, pp 17–45

[2] BABCOCK, H. *An Experiment in the Measurement of Mental Deterioration.—Archives of Psychology*, Vol. XVIII, No 117, 1930, pp 105.

[3] SIMMINS, C · *Deterioration of " G " in Psychotic Patients —Journal of Mental Science*, Vol LXXIX, 1933, pp 704–734.

[4] JASTAK, J *Variability of Psychometric Performances in Mental Diagnosis.* (New York J Jastak, 1934, pp. 99.)

[5] *Memoirs of the National Academy of Sciences*, Vol XV (Washington Government Printing Office, 1921, pp. 890.)

[6] Personal communication

[7] *Op cit*

These arguments for individual as against group tests are probably widely known, and accepted by the majority of practising psychologists.[1] But they have recently been challenged by Cattell,[2] and his position requires serious consideration Cattell's criticisms of the subjectivity of the Binet scale are well merited, though he has not been able to show how such subjectivity can be eliminated without a great loss in the practical utility of psychometric methods. He admits that psychologists can obtain a certain insight into the child's or adult's mentality by applying the Binet scale and performance tests, that cannot be obtained by more objective methods But this insight is liable to personal bias and is open to attack on the grounds that it represents a vague composite of ill-defined traits and abilities. Such traits, according to Cattell, should be isolated by methods of factorial analysis and their existence definitely proved or disproved , those that survive should then be measured singly by objective tests For example Alexander's work suggests that performance tests involve a certain amount of practical intelligence (*F*), a number of specific factors and not very much *g* , that verbal group tests involve a verbal factor (*v*) in addition to *g* , and that the Binet scale depends on all three factors Similarly Cox's researches[3] have thrown light on the various factors measured by tests of mechanical ability. And further advances should soon result from the investigations of the Unitary Traits Committee [4]

Now though such findings are of obvious importance to the psychologist at the clinic, and should be translated into practice as soon as possible, yet there are several reasons why we may hesitate to accept

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[1] Cf the discussion on the Binet test in the Proceedings of *The Inter-Clinic Conference*, 1935 (London Child Guidance Council, pp 56)

[2] CATTELL, R B. *A Guide to Mental Testing* (University of London Press, 1936, pp 312)

[3] COX, J W *Manual Skill* (Cambridge University Press, 1934, pp 247.)

[4] HOLZINGER, K J *Recent Research on Unitary Mental Traits*—*Character and Personality*, Vol IV, 1936, pp. 335–343

Cattell's position in full. First there is the difficulty that at present few of these unitary traits are sufficiently firmly established, and that fewer still can be measured simply and accurately, hence it is still necessary to employ tests which depend on a conglomeration of factors Secondly, it is hard to reconcile this position with Thomson's reminder that an infinite number of different factorizations of the same test results are possible, and that statistical methods of analysis cannot yield psychological realities [1] Thirdly we are entitled to doubt whether a series of scores on separate traits, however extensive, would give us the total personality that we need to know about in advising and treating a child or adult. The scores themselves are of little value to us unless we have had opportunities to observe the parts played by such factors in the subject's personality, in his reactions to the clinic and to his everyday environment This latter argument has aroused much criticism[2], hence it is noteworthy that such authorities as Myers and Terman hold similar viewpoints. Myers[3] discourages too great a reliance on tests in vocational guidance, for . " man is more than a mosaic of separate abilities, and vocational guidance is not to be achieved merely by fitting together of such pieces in jigsaw fashion." According to Terman[4], "A true picture of a personality cannot be pieced together from any number of test scores The total is an organismic, not an additive, total. Personality traits are not merely intercorrelated, but are functionally inter-active in infinitely complex ways now little understood "

We may conclude then that the psychologist is justified in his opinion that the Stanford or Burt-Stanford scale is the most valuable psychodiagnostic instrument available, until some more accurate test is constructed along the same lines. With the omission of a few items it is still extraordinarily revealing even at the adolescent and adult level. But how may we correct some of the defects of standardization at these levels ?

Penrose[5] has worked out an ingenious method of calculating I Q 's which allows for the gradual deceleration of growth of M A instead of assuming a sudden stoppage at 14 years, or at some other limit This method, when applied to the I Q.'s between C A 's 10 and 15+ in Table I, brought about greater smoothness, but did not help to raise the adult I.Q Another way might be to assume that the Vocabulary test is correctly standardized, and then to transpose any Binet M A of 12 or more years into the corresponding Vocabulary M.A shown in Table II But this assumption would be difficult to justify, especially since, as noted above, Vocabulary may continue to grow in adulthood Probably the best solution would be to follow the method worked out by Cattell in standardizing his Group Test Scale III[1], that is to determine empirically the distribution of Binet M A.'s among adults above the average level and to cut off appropriate portions of the distribution to correspond to M.A.'s of 15, 16, etc , years Since, however, no such distribution for normal adults was available the following simplified, and somewhat arbitrary, scheme was adopted

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[1] Thomson, G H *On Complete Families of Correlation Coefficients, and their Tendency to Zero Tetrad-Differences*—*British Journal of Psychology*, Vol XXVI, 1935, pp 63–92

[2] Cf Spearman, C *The Old and the Young Sciences of Character*—*Character and Personality*, Vol IV, 1935, pp 11–16

[3] Myers, C S *Some Present Day Trends in Vocational Psychology*—This *Journal*, Vol VI, 1936, pp 225–232

[4] Terman, L M *Measurement of Personality*—*Science*, Vol LXXX, 1934, pp. 605-608

[5] Personal communication

It is assumed that Burt's standardization is correct up to the 12 year level, but that above that level the obtained M A.'s need to be extended upwards Taking 13 · 7 as the approximate average adult score, this is denoted as 14 years, and progressively larger corrections are applied to higher M.A.'s. The maximum score of 18 years is called 21 years, so that the maximum I.Q. (using 14 as denominator) may be 150 The corrections for intermediate M.A.'s are then found by interpolation The obtained, and these corresponding corrected M A 's are listed in Table III

It is not proposed that in actual practice the obtained Binet M A.'s should be discarded in favour of these hypothetical corrected M A.'s. But it does seem likely that if both the original and the corrected figures are quoted in a psychologist's report, the latter may give a somewhat truer notion of the subject's intellectual level For example, when a subject aged 14 or over obtains M A 16 0 years, the original I Q will be 114, the corrected I Q 127. In terms of the scale of I.Q.'s to which we are accustomed among young children, the figure 127 will probably represent his ability better than does 114 Certainly it will coincide more closely with an I.Q. based on the Vocabulary test or on some well-standardized group test Finally it should be noted that these corrections are intended to apply only to the Burt-Stanford revision which is scored up to 18 years , the writer is unable to say whether the ordinary Stanford revision, which is scored up to 19 6, is in need of any similar corrections.

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[1] CATTELL, R B *Occupational Norms of Intelligence, and the Standardization of an Adult Intelligence Test.—British Journal of Psychology,* Vol XXV, 1934, pp 1–28

TABLE III

Obtained M.A	*Corrected M A*												
12 0	12 1	13 0	13 3	14 0	14 5	15 0	16 0	16 0	17 10	17 0	19 3
1	12 2	1	13 4	1	14 7	1	16 2	1	17 11	1	19 5
2	12 4	2	13 5	2	14 8	2	16 4	2	18 0	2	19 6
3	12 5	3	13 6	3	14 10	3	16 6	3	18 2	3	19 8
4	12 6	4	13 8	4	15 0	4	16 8	4	18 4	4	19 10
5	12 7	5	13 9	5	15 1	5	16 10	5	18 5	5	20 0
6	12 8	6	13 10	6	15 3	6	16 11	6	18 6	6	20 1
7	12 9	7	14 0	7	15 5	7	17 1	7	18 8	7	20 3
8	12 10	8	14 1	8	15 6	8	17 3	8	18 9	8	20 5
9	12 11	9	14 2	9	15 8	9	17 4	9	18 11	9	20 6
10	13 0	10	14 3	10	15 9	10	17 6	10	19 0	10	20 8
11	13 1	11	14 4	11	15 11	11	17 8	11	19 2	11	20 10
										18 0	21 0

III —PERFORMANCE TESTS

The standardization of performance tests in this country is still more inadequate than that of Stanford-Binet, for most of these tests originated in America, and the materials of which they are composed cannot easily be "translated" as can the verbal Binet material The blocks, pictures, etc., may or may not be equally familiar or appropriate to American and to British children. We might expect British norms to be slightly more lenient, since Burt found, in restandardizing Stanford-Binet, that British children were a little superior on the verbal components and a little inferior on the more practical components. Moreover, some of the tests embody characteristically American features, e g., Picture Completion II However, the actual results of those who have attempted to restandardize are sometimes higher, sometimes lower than the American norms, and different investigations, such as those of Gaw and Earle[1], often conflict.

The primary source of the norms used in this country is Pintner and Paterson's study[2] Arthur's more recent standardization[3] has shown that many of these are innaccurate, and her figures should be adopted when no British figures are available Gaw provided norms for a number of tests over the 10–13 year range, but it seems doubtful whether her testees were a representative sample At 13 years she tested 100 children who were believed to be somewhat subnormal; no data as to the size or nature of the 10–12 year groups has been published Much larger groups were tested at 13 10 by Earle and Milner, and their results often diverge from Gaw's 13 year figures In the present writer's experience the Gaw-Pintner-Paterson norms tend to be too strict, and this observation is confirmed by a report from the Harris Academy Psychological Clinic[4] Here the Drever-Collins scale, which contains some of Gaw's tests, is often applied, and it yields distinctly higher performance test M.A.'s than does Gaw's scale A further piece of evidence from normal children has been supplied by Miss Leiper Her 22 girls, mentioned above, with Passalong I Q 98½ and Binet I Q 92, were found to have an average performance test I Q of 88 on the Gaw-Pintner-Paterson scale

Some more reliable norms should emerge from an investigation now in progress under the Scottish Council for Research in Education And Alexander has recently provided useful results for three tests, Passalong,

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[1] *Op cit*

[2] PINTNER, R and PATERSON, D G *A Scale of Performance Tests* (New York Appleton, 1923, pp 218)

[3] ARTHUR, G *A Point Scale of Performance Tests*, Vols. I and II (New York Commonwealth Fund, 1933)

[4] Personal communication

Cube Construction and Kohs' Block Design[1] One other restandardization, that of Drever and Collins[2], deserves mention, though it does not help us in the establishment of age norms for separate tests, since it is expressed in the form of a point scale The whole battery of tests must be applied before a performance test M A can be determined Such a battery is of great value in testing deaf children, or others whose ability cannot be assessed by Binet But we also need tests with separate norms, a few of which can be given as a supplement to Binet. Often the clinic psychologist has less then an hour in which to obtain an all-round impression of a child's abilities and traits. He or she is less concerned to obtain a reliable non-verbal M A than to find whether or not there is a gross discrepancy between the child's abilities at predominantly verbal and predominantly practical tests The inclusion of a few performance tests is desirable also for breaking down resistances , and they afford excellent opportunities for observation of the child's temperamental qualities.

In spite of the subnormality of clinic populations, it was hoped that the norms for certain tests might be revised on the basis of clinic cases, by comparing the test results not with the C A 's of the testees, but with their Binet M A 's Arthur's investigation has shown that performance test norms tabulated according to C.A and to Binet M A are closely similar in a normal group But, unfortunately, the assumption that a clinic group will obtain equivalent Binet and performance test M.A 's seems to apply only to certain tests Numerous experiments have shown that on some tests there is a specific retardation among nervous and difficult children, delinquents and mental patients[3] Such tests are presumably more affected by emotional tensions and inhibitions or by mental deterioration than is the Binet test as a whole.

It is important therefore to discover which tests are most dependent on emotional adjustment In the following sections a number of tests, which have been used fairly extensively by the writer, are considered. The mean or median scores for year or 2–3 year groups (according to the numbers of cases available) are tabulated, and the variability indicated by Q, the semi-interquartile range, sex differences are noted These figures are scored by the best available norms, and the performance test M.A.'s are compared with the mean Binet M.A.'s (above 12 years the corrected Binet M.A.'s, described above, are generally employed). The correlation of each test with Binet is given so as to indicate the usefulness of the test as a supplement to Binet and the extent to which it may be measuring practical or emotional factors that play little part in Binet A fuller factorial analysis would be obviously desirable, but the nature of the groups tested and the fewness of overlapping cases precluded any detailed study of the relations of the tests to one another Finally, with tests of sufficient difficulty, tentative suggestions are given for extending the norms to higher age levels The procedure is generally similar to that adopted with the Binet test, i e, 14 is taken as the average, 21 as the maximum adult score

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[1] *Op cit*

[2] Drever, J and Collins, M *Performance Tests of Intelligence* (2nd ed) (Edinburgh Oliver and Boyd, 1936, pp 56)

[3] Cf Jastak, J *op cit*, and the following articles

Karpeles, L. M *A Further Investigation of the Porteus Maze Test as a Discriminative Measure in Delinquency*—*Journal of Applied Psychology*, Vol XVI, 1932, pp 427–437

Mennens, G *Etude Experimentale de Différentes Aptitudes Psychiques chez les Prisonniers.*—*Journal de Psychologie*, Vol. XXVIII, 1931, pp 283–302

Perry, D *Interpretations of the Reactions of the Feeble-minded on the Healy Picture Construction Test II.*—*Journal of Delinquency*, Vol VIII, 1922, pp 75–86

Poull, L E , and Montgomery, R P. *The Porteus Maze Test as a Discriminatory Measure in Delinquency*—*Journal of Applied Psychology*, Vol XIII, 1929, pp 145–151.

Shakow, D., and Millard, M S *A Psychometric Study of* 150 *Adult Delinquents.*—*Journal of Social Psychology*, Vol VI, 1935, pp 437–457

IV —MARE AND FOAL TEST

This is an especially attractive test to use as an ice-breaker at the beginning of a session Pintner and Paterson and Arthur supply norms which agree well up to 9 years These figures, together with the Merrill-Palmer figures for the youngest groups[1], have been combined to yield the following norms

TABLE IV.

Mare and Foal M A	4	5	6	7	8	9	10	11	12
Time in seconds . . .	180	100	75	59	46	38	34	31	29

The geometrical pieces are not used, and no account is taken of errors. Stutsman has shown that time and errors correlate highly, and Arthur has discarded them as a basis for scoring

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[1] STUTSMAN, R *Mental Measurement of Preschool Children.* (Yonkers, N Y . World Book Co., 1931, pp. 368)

The following results were obtained at the Maudsley Hospital

TABLE V.

C A Group	*N*	*Mean Mare and Foal M A*	*Mean Binet M A*
4 0-6 11	25	6 19	6 01
7+	29	7 77	7·28
8+	16	8·61	8·61
9+	21	7 62	9 02
	91		

The Q's for these groups averaged 1·32 years There was a decided sex difference, the mean Mare and Foal I.Q for 44 boys being 102 and for 47 girls 91 (though their average Binet I Q was the same, namely 96½). This difference is twice its S D. and may therefore not be significant If confirmed, the norms might be retained, but boys should be scored half a year more strictly, girls half a year more leniently

The agreement shown in Table V between Binet and Mare and Foal M.A 's is good up to 8 years, though possibly the test is a little too easy for younger children Above this age the discriminative power of the test is low, and Pintner's and Arthur's norms disagree. Thus the discrepancy which appears in this table is not surprising, clearly the test had better not be used at this level

The correlation between Binet and Mare and Foal was + 665 ± 039, both scores being expressed as I.Q 's so as to eliminate C A This is high enough to justify the use of the test as a supplement to Binet

V.—SHIP TEST

This test is an excellent ice-breaker with children who are too old for Mare and Foal It sets them at ease and gives the tester some time to make notes about their appearance and their initial behaviour. In other respects it is probably not a very good test of its kind, its age range being limited and its scoring awkward It does, however, give fairly high correlations with Binet

Arthur's scoring method seems preferable to Pintner and Paterson's one point is given for each correct contact either of the edges of two pieces with one another, or of an edge with the frame Thus a correct solution scores 27 ten for the contacts of the top and bottom edges with the frame, four for side contacts with the frame, eight for side contacts of pieces with one another, and five for contacts of the top row of pieces with the bottom By averaging and smoothing Arthur's figures the norms listed in Table VI were obtained Preliminary observation suggested that the more intelligent subjects completed the test (either correctly or incorrectly) much more quickly than the less intelligent And since the scoring by points is very restricted in range and discriminative power, an attempt was made to develop supplementary speed norms A silent stop watch was used so that subjects were quite unaware that they were timed, they were allowed to continue until they professed themselves satisfied with their arrangement of the pieces. By plotting the time for 64 subjects against Binet M A, and drawing a curve by eye, the highly tentative figures given in Table VI were found They may require considerable revision if tried out on a larger group of normal children

TABLE VI

Ship M A ..	5	6	7	8	9	10	11	12	13	14
Points .	3–6	7–10	11–15	16–18	19–20	21–22	—	27	—	—
Time (secs.) ..	—	—	—	270	180	120	86	64	47	40

Since the C.A groups tested at the Maudsley Hospital were too unrepresentative, the results given in Table VII are grouped according to Binet M A. No sex difference was found, though there was a slight tendency, not significant, for boys to be quicker

TABLE VII

Binet M A Group	*Mean M A*	*N*	*Mean Ship Score*	*Mean Ship M A*	*N scored for time*	*Median Time (secs.)*
6 . 0–8 . 11	8 05	11	16 36	8 25	9	165
9+	9 42	12	20 58	9 57	9	140
10+	10·41	19	20·68	9 61	19	100
11+	11·36	11	22 31	10 22	11	87
12+	13·37	17	23·41	10·64	16	66
		70			64	

The table does not yield any information as to the accuracy of the 5–7 year point score norms, but it shows that at 8–9 years M.A. Ship and Binet agree fairly closely. Above that level the Ship M.A.'s are, of course, too low owing to the restricted maximum. It would appear that speed offers a better differentiation between bright and dull subjects than does the ordinary point score; actually, however, the variability of speeds is so great as to offset this advantage. For the Q's of scores and times in these groups averaged 20 per cent and 43 per cent respectively. Nevertheless, at upper age levels the speed method of scoring is as good as, or better than the point method, as may be seen from the following correlations between Ship and Binet I.Q.'s. The highest coefficient is obtained when both scoring methods are combined. Among younger subjects (5 to 8 years) the speed method is unlikely to possess much value.

Ship score I.Q. with Binet I.Q.	39 subjects of C.A. less than 12 years	$r=+{\cdot}579\pm{\cdot}072$
	All subjects, Ship I.Q.'s being calculated with 12 as the maximum denominator.	$r=+{\cdot}508\pm{\cdot}060$
Ship time I.Q. with Binet I.Q.	23 subjects who obtained perfect scores	$r=+{\cdot}510\pm{\cdot}109$
	All subjects who were timed.	$r=+{\cdot}652\pm{\cdot}050$
Ship Score with Ship Time I.Q.'s...		$r=+{\cdot}442\pm{\cdot}070$
Combined Ship Score and Time I.Q. with Binet I.Q.		$r=+{\cdot}684\pm{\cdot}046$

The following tests will be considered in a further article, in the next number: Seguin-Goddard Formboard, Healy Picture Completion Test II, Porteus Mazes, Passalong, Moorrees Formboard, Burt's Graded Word Reading Test. A summary and foreign résumés will be given there.

FORMAL TRAINING.

SOME COMMENTS UPON PROFESSOR HAMLEY'S ARTICLE.

BY WILLIAM PHILLIPS

THE impression left on my mind after reading Professor Hamley's article[1] was that the theoretical and practical problems which are grouped around what is called formal training or mental discipline are almost as far from solution as they were (say) at the beginning of this century Additional readings failed to remove the feeling that in so far as the writer of the article was concerned, he would hesitate to offer any definite guidance to anyone who might desire to form a judgment on the reasonableness or otherwise of making Latin or Mathematics a compulsory subject for every intending university matriculant. In one place he speaks of " the absurd claims that are sometimes made for the disciplinary value of the classics " (p 246), and, in another, he says that if Latin or Greek are taught as to provide " functional thinking " (a term to which he gives what seems to me a vague and inadequate definition), either would produce as valuable a result as that which, so we are assured, has followed the teaching of algebra when presented on the lines laid down in such a text-book as Nunn's " Algebra ": this Professor Hamley describes as a treatise on " functional thinking " (p 247). In a third place he maintains that " the study of Latin or mathematics, or, indeed, of any other subject, may be justified to some extent on utilitarian grounds, but its full justification can only be sought in terms of a higher or more deeply significant mode of life ". (p 242)

In view of the hold which various forms of the idea of " formal training " still exert on many teachers and administrators, and the extent to which that dogma is considered to justify insistence on the compulsory teaching of certain subjects to boys and girls in secondary schools, and acquiescence in the demand made for them in certain matriculation examinations, I cannot help fearing that Hamley's article may do much harm I may, because of my experience here in Wales of the baneful effects of compulsory subjects introduced under the belief that they were special agents for producing " mental discipline," be too ready to believe in the possible reappearance of a similar compulsion under the influence of that dogma It is not however an accident that three writers (Archer, Cavenagh and the late J A. Green) who have made valuable contributions on this subject to this JOURNAL, or to its predecessors, occupy or did occupy Chairs of Education in Wales (Most of my own articles on the topic have been written in Welsh, and for those who know that language, I append a few references)[1] In no country has the belief in the special virtues of Latin and Mathematics, urged on it by the early principals and professors who came to the Welsh colleges from Oxford and Cambridge, done more to make education largely uneducational than in Wales In the First and Second School Certificate Examinations held by the Central Welsh Board for Intermediate Examination in 1935 and 1936, 2,337 and 2,398 pupils took Latin (although it is no longer an essential part of a Matriculation Certificate), at the Senior Stage these numbers were reduced to 235 and 230 at the Higher Certificate Stage In many secondary schools pupils are, on entry, compelled to take, in addition to English, two, and in some districts three, languages, and to continue them for at least two years ! Latin is almost invariably one of these languages If writers on education have any guidance to offer on such a situation, it should be given in no uncertain note

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[1] H R. HAMLEY *Formal Training A Critical Survey of Experimental Work.*—This *Journal,* Vol VI, Part III, November, 1936, pp 233-249.

I recognize that the aim which Hamley put before him was to make a "Critical Survey of Experimental Work" But at the outset he turns aside to record that one of his correspondents had complained to him that the issue had been settled out of court, and wanted to know why the terms of settlement had not been made public Without pushing this reference to a court of law with its judge and jury too far, I am safe in saying that the issue on one point in the matter of formal training has been pronounced upon, and that openly and publicly I admit that the jury (composed of students of education) may not have given a unanimous verdict, but the majority for it was impressive Indeed, I think it is correct to say that a verdict was delivered early in the century The year 1904 saw the appearance of Raymont's "Principles of Education" (the author was then Professor of Education at Cardiff University College). That book had a chapter on the "Choice of Studies," and in it an attempt was made, and with singular success, to demonstrate that "though the *method* of instruction should be carefully devised with a view to mental training, it is misleading to say that the choice of the *matter* of instruction depends upon considerations of discipline" (p. 100) on the contrary, the decision as to whether a subject is or is not to be included in the curriculum must depend on its intrinsic value. In his book, " Education," published in 1931, we find the writer firmly holding the same position " We reject the idea," he says, " of mental discipline as the key to the problem of curricula, and we accept the idea of social utility, provided that the word utility is understood in the broadest sense—utility for leisure as well as for labour " (pp 159, 160). In 1905, a book appeared in America which has, in its turn, exercised a deep influence on education in all parts of the world I refer to Bagley's " The Educative Process," and here too the dogma of formal training is regarded as outworn (cf. p 218)

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[1] Y *Traethodydd, The Place of Latin in Welsh Secondary Schools*, Vol. 65 (Nov, 1910), pp. 450–464, *The Place of Mathematics in Welsh Secondary Schools*, Vol 76 (April, 1921), pp 90–95

Y Beirniad, Can the Mind be Trained? Vol V (1915–16), pp 84–95, 163–173, 252–263, VI (1916–17), pp. 53–66, with correction, p 127.

Hamley's treatment of the related problems of mental discipline and the teaching of Latin is unfortunately wanting in both definiteness and fullness. " It is interesting to note," he writes, " that comparatively few researches on formal training have had Latin or Greek as their subjects, (p. 239) He refers to the Broyler–Thorndike–Woodward " Second Study of Discipline in High School Studies " (1927), which followed upon Thorndike's " Mental Discipline in High School Studies " (1924) A helpful summary is also given of C. H. Whelden's Yale study, " Training in Latin and the Quality of other Academic Work " (1933) Three other U S A works, one published and two unpublished, are also mentioned. But for some reason not clear to me, he does not deal with a very striking English enquiry that has a direct bearing on the teaching of Latin, namely, an article by R A Pritchard which appeared in this JOURNAL (Vol V (1935), pp 157–179, 229–241), entitled " The Relative Popularity of Secondary School Subjects at Various Ages," the implications of which are fully discussed in one chapter of a work by C W Valentine, called " Latin Its Place and Value in Education " (1935)

It is not necessary for me to say more concerning Pritchard's work than to remind my readers that his main inquiry was conducted by questionnaire sent out to forty-seven secondary schools in England, specially selected because in them " the teaching was likely to be good, as indicated by personal knowledge and successful results in the Northern Universities Matriculation Examination " In all, 8,273 replies were received from 21 boys', 16 girls' and 10 mixed schools , from 4,581 boys and 3,692 girls Two main objects were aimed at , the first was to discover the subject each pupil liked best, second best, and so on to the one liked least, and the second aim to discover the reasons which weighed with the scholars in giving one subject as the best-liked and the other as the worst-liked subject. The results showed Latin to be by far the most unpopular subject for boys and girls From Pritchard's classified summary of the grounds assigned for the pupils' like or dislike of Latin, it is clear that its study has a most deplorable influence on many of them, and interest is a vital element in the training of cognitive processes

Valentine's book, based partly on his experience as a teacher of Latin, contains a searching and sympathetic examination of the various reasons that have been advanced for giving Latin a favoured, if not a compulsory, place in our secondary schools The problem of mental training in its relation to the subject has been given special prominence In so far as I am able to judge we have in this book a comprehensive, competent and judicial summing-up (in open court) of the whole question (I may perhaps suspect a little leaning at times on the judge's part to the prisoner at the bar) The author's conclusion is that no ground exists in support of the view that a compulsory place should be given to Latin in secondary education There are in Valentine's book and Pritchard's article valuable illustrations of the conative-affective aspect of cognitive schemata

Professor Hamley has dwelt more fully with the mental training that may, under certain circumstances, be obtained from a study of mathematics His general conclusion is to me, however, so vague as to be confusing. I repeat his words which were quoted earlier in this Comment " The study of Latin or mathematics or, indeed, of any other subject may be justified to some extent on utilitarian grounds, but its full significance can only be sought in terms of a higher or more deeply significant mode of life " (p 242) In another place, he says that the "American teachers of mathematics have strenuously resisted the suggestion that the main aim of school mathematics should be utilitarian " (p 236).

At no time has it been so necessary and reasonable as at present to adhere to Raymont's judgment concerning the ground on which one should decide whether a subject ought or ought not to be included in the curriculum, for the importance to the community of a widespread mastery over English speech, composition and literature, one or more branches of mathematics, geography, history, physics, chemistry, biology, drawing and music, is, in spite of its urgency, often overlooked. For instance, to judge by the amount of attention paid in some schools in this country to English, one would not conclude that it is in any sense a world-language The social utility (in the sense defined by Raymont) of every one of these subjects is evident, as is also that of physical training and certain forms of practical work Which of them is to be included, and which left out, and also the place (if any) to be given to a modern or classical language, cannot be decided by any appeal to a scale of disciplinary power said to be possessed by particular studies, we are driven to make as accurate an assessment as we can of their comparative intrinsic values to the community

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I cannot here make even a short examination of Hamley's treatment of the general question, including his use of the terms "identical elements," "function," and "transfer." But I may say that in view of Archer's objection to the use of the latter term, expressed in his weighty contribution to the series of papers on "The Disciplinary Value of School Subjects" which appeared in the *Forum of Education* in 1925[1], I should have valued Hamley's defence of its retention It would no doubt have enabled me to appreciate more fully the advantage to be gained by the definition he offers, namely, that transfer is "communication"

* * * *

The manner in which Hamley has attempted to modernize the discussion of the psychological problems involved in "mental training," by relating them to Professor Spearman's presentation of the Principles of Cognition and to some aspects of the Gestalt Theory, appears to me to be uncommonly stimulating The emphasis he places on the conative-affective aspect of all cognitive schemata, and the way he uses this to reinforce the fact (so often overlooked by those who advocate the compulsory teaching of certain subjects to all secondary pupils, whatever their intellectual ability and interests may be) that the extent and value of the general influence which may be diffused by the teaching of any topic is dependent on the *conditions* under which the latter is studied, will, I believe, secure close attention to his article, and expecially to its fourth section It is interesting to notice the extent to which Angell and Judd, in their contributions to the famous discussion in the *Educational Review* for 1908, arrived at conclusions which would fit in with those which Professor Hamley has reached "The general conclusion seems to be," he says, "that transfer of training depends upon the conscious acceptance by the learner of methods, procedures, principles, sentiments and ideals. If any word in this statement should be underlined, it is the word *conscious*." I wish, however, that he had not thought it unnecessary to put in the caveat that nothing will so certainly defeat such a transfer as a premature insistence on the acceptance of rules and ideals by the pupil before he has been presented with material of all kinds which his subconscious mind can assimilate, *organize* and *classify*, but as I have, in the *Forum of Education* for 1927 (Vol V, pp 143-4), and at greater length in the volume for 1930, dealt with this all-important matter, I need not say anything more about it now, except to remind my readers of Archer's discussion of the point[2]

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[1] *Forum of Education*, III (1925), pp 175–185.
[2] Ibid., pp 178–9

CRITICAL NOTICE.

THE SECRET OF CHILDHOOD · by MARIA MONTESSORI (Longmans, pp 279, 7s 6d.)

" ORIGINAL sin is the fault and corruption of the nature of every man, whereby man is very far gone from original righteousness and is of his own nature inclined to evil . . " These words were written in 1562, but it is only in the years of this century that we have begun to have serious doubts of their truth The assumption of the natural wickedness of man, and especially of children, has guided much of our public policy, and most of our education We were so anxious to make people better that we had little time to find out either what they were, and still less time to discover what they wanted to be But in this century we have changed We no longer spend our time thinking what people want to do and telling them not to We prefer to use our ingenuity in devising means by which they can satisfy their wishes without damaging the public But it is our attitude to children that has undergone the most complete change.

This new attitude has many causes, but Madame Montessori can justly claim to be the chief prophet of the new order ; for she has asserted not only that children are all good, but the more fundamental proposition that they are all wise—at least as far as their own needs go—supposing they are placed in an atmosphere uncorrupted by the vices of grown-ups Madame Montessori's faith is both scientific and religious. She bids us receive the new-born babe as the Christ Child come among us, and then study him with all the resources of a refined technique. The tiny infant, fresh from the appalling struggle of birth, must be received with the tender marvelling skill of the priest handling the Host, and through his childhood we must observe and study him, subduing our own impulses, sacrificing our own convenience, habits of thought, and life in order to provide an environment in which the developing being can make the great effort of building up his own life

This conception is mystical, it is also practical Many of those who have claimed freedom for children, and urged that they should work out their own salvation, have forgotten the part played by environment They have allowed children to imitate the defects of the adults with whom they live, they have never reflected on the special help the child requires in his task of assimilation. Leave a child free in the drawing-room and give him no idea of occupation, and broken crockery, torn cushions, and tears are the result, place him in a Montessori school with unbreakable and easily moved furniture, plenty of interesting toys, and a quiet teacher always there to provide suggestions and lead the child from one power to another, and virtue and industry reign. Naughtiness for Madame Montessori is always an affair of maladjustment. It arises when the adult—lazy, hurried, or imperceptive—tries to force her ways on the child and thus thwarts the urge of his growing needs. This is very largely true, but in saying this we must not for a moment imagine that the child is left without any moral training The child may have within him all the virtues. He loves as he will never love again, he is eager for life and experience, he works harder than at any time in his life, but these latent virtues must be given scope in the right environment A home or a school as Madame Montessori imagines is essentially a moral place Each child from the beginning is encouraged to take its place in society, to consider others and to work for the good of all. There must be no noise, no disorder The teacher is quiet in her voice and movements. There is a garden in which to play so that quietness within doors is no hardship There is no tyranny to be resisted, no idle minutes to be filled with purposeless noise. Moreover, Madame Montessori has discovered, and discovered rightly, that little children like order There is a stage, though she has not mentioned it, when children's play with toys consists of endless arranging of objects, there is an earlier stage that she does mention, when disorder in the environment will almost make a child ill with worry This natural tendency can be used in school, and the picture of infant virtue is almost complete.

As important as this emphasis on child virtue is the emphasis on child wisdom. In the long and difficult process of development, the child alone knows what it really needs Not all children pursue quite the same course, or take the steps in the same order. No one but the child knows just what he needs at a given moment. The duty of the teacher is to put before the child possible occupations, then, from among the possible activities, the child himself chooses, and continues with the occupation he has chosen till its utility for his development is at an end, when he passes to another similarly chosen It is simple in theory, in practice it depends on the provision of the ideally suitable occupations. Perhaps Madame Montessori has devised them or perhaps she has relied too much on an ideal of scientific simplification and produced rather barren abstractions that the intelligent child will desert for even simpler material such as bricks, which allow him greater imaginative scope.

It is here, if anywhere, that Madame Montessori fails. A scientist herself, she forgets and distrusts the imagination, and yet it is the child's most potent weapon in the conquest of the world. It is the method by which he extends his knowledge over the whole range of human relations, by which he tries to overcome his fears and solve his problems If the child is to be our guide to his own necessities, then we must place imaginative material in the forefront of his needs Give a child a set of blocks to arrange in order of size, and in half a minute he is playing trains with them. Leave him with a pencil and paper to draw squares, and we return to find that he has drawn a picture that represents a wish fulfilment as clearly as any of Freud's dreams. While to Madame Montessori belongs the honour of being the true prophet of childhood in this century, we must not forget that children do not live by cubes alone, but by the words of the story-teller and the imagination of the artist

MARY STURT.

BOOK REVIEWS.

Psychometric Methods, 1936 By J P GUILFORD, Professor of Psychology, University of Nebraska. (McGraw Hill Publishing Company, pp. ix + 566, 54 figures. 25s)

The primary aim is stated to be that of teaching the student of psychology how to deal effectively and intelligently with quantitative data, admitting that he may be in his first year of graduate work, and with only the mathematical background of, say, a single course of college algebra A not less important aim—one greater in many ways—is that of helping on the movement to bring the statistics of psychophysics and of mental testing into harmony

The book is in three parts, covering psychophysical methods, scaling methods and correlational and mental test methods respectively With so much to survey, it is impossible to go into details Whether reading it as a whole, or making check by looking up items from the index, one cannot fail to be impressed by the scope of the work Virtually everything the ordinary person would want is given

Criticisms must be envisaged in the light of what the author has set out to do We are warned in the preface that "since Tichener's Quantitative Manuals no book in English has been devoted primarily or in great detail to the psychophysical methods," and that "It is time gains in that field should be consolidated " Whether one agrees that such books as Brown and Thompson on the " Essentials of Mental Measurement " should be swept on one side in this way or not, there will be agreement that psychophysics must be kept up to date, the only problem being the extent to which the student in his first year need be bothered with details Were he the only person concerned, it might be urged that the present book is just a little overloaded On the other hand, there is the further aim of bringing the two main fields of psychological statistics into harmony We have again to agree that " even to-day the mental-tester who is unschooled in psychophysics and its methods invents anew the tools for dissecting his tests—tools which might readily have been borrowed directly from psychophysics " And that being so, much must obviously be included that could otherwise have been relegated to an appendix or even omitted But this much can at least be said in mitigation Guilford has made his pages as readable as may be

Looking at possible criticisms from the point of view of future developments, or in other words turning from what might have been omitted to what might have been included, one notes the relative absence of references to *processes* There is a chapter on curve fitting in which learning and forgetting curves are used as illustrations, but generally speaking the student is offered little or nothing on such problems as those of fluctuations of attention, work and fatigue This is a pity, for although it can perhaps be said that we here need no more than the methods Guilford describes in his various sections, the fact remains that he there recognizes the need to go into particulars If the student needs guidance on particular problems in mental testing or psychophysics, he needs it in respect of problems of fatigue as well The argument is, however, better given generally If we are ultimately to harmonize the methods of psychophysics and mental-testing, we shall have explicitly to face the fact that in working a mental test the child is going through a complex system of processes His rate of output varies from moment to moment, and is subject to or determined by many vaguely known or even unknown conditions On the other hand, our present statistical methods trace their descent from, and are most appropriate to problems of coin tossing and dice throwing If, therefore, it is safer to speak of thinking rather than of thought , of attending rather than of attention, and so on, then by the same argument, we ought to think of corresponding mental measures in terms of processes rather than of static and unitary coins, dice or chunks of " mind " The reviewer is very shy of the term " unitary mental trait," and from that angle alone finds no difficulty in accepting the statement that " the methods of Kelley and Hotelling are mathematically and statistically rigorous, but they frequently lead to unitary abilities that are difficult to analyse " The names are quoted as the author gives them, but the trouble is found elsewhere As it happens, we are most of us alive to the difficulty It is no new thing to urge that one cannot determine how a herring swims into the net by a study of the characteristics of kippers in a box In fact, arguments of the kind are frequently advanced against the use of statistics at all The problem is raised here, however, not as a sop to those who would condemn statistics because of present imperfections, but to add point to a profession of the belief that the fields of psychophysics and mental-testing will ultimately be fused not merely by borrowing from one another, as illustrated in this book, but by a merging in and through a further and quantitative study of processes as such

I am not sure that the two-factor controversy has been clearly presented On page 467 we are told Spearman " insists " that his s-factors are confined to one test alone The bogey is then held over us that if so, vocational selection and guidance are impossible We must apparently vote for the random sampling candidate, who promises both in virtue of the fact that he will allow overlap if he is returned to office. Yet in the formal presentation of the Spearman doctrines there is a diagram (Fig 45A) showing overlapping s-factors, and we are given a long list of group factors recognized by the Spearman school (page 464) It must be all very puzzling to the student who does not tumble to the fact that in the one case Spearman is being held to the strict logic of the two-factor title, whereas in the other he is being presented (as he would wish to be) in terms of a more " ecletic " doctrine Incidentally, there is a slip in the calculation of r_o on page 465.

It is, however, ungrateful to pick holes here and there, particularly controversial holes If there are flaws, it is because a work of the kind could hardly be launched as a thing perfect in every respect As a text-book it is an admirable achievement, a book strongly to be recommended

S.J.F P

Can Delinquency be Measured?: By SOPHIA M. ROBISON. (Published for the Welfare Council of New York City by Columbia University Press English Agents, Oxford University Press pp. 210 and appendices. 15s net)

As R M. MacIver states in his foreword, the approach of the authoress to her subject should recommend this book " To all who are interested in the important subject with which she deals, or, more broadly, in the application of scientific method to social problems."

The book is fundamentally a criticism of contemporary statistical methods of measuring delinquency and is a salutary exposition of the danger of generalizations from a study of delinquency statistics as commonly presented It is perhaps unfortunate for English readers that the statistical data upon which Mrs Robison bases her conclusions are in regard to New York City—a group of communities presenting problems with many of which we are unfamiliar in this country—but it is reasonable to assume that strictly comparable conclusions would have been reached by a similar sociological study of any heterogeneous community.

As a critique of method the book is worthy of careful consideration, for however obvious may be some of the pitfalls she exposes their existence has been overlooked by many students Mrs Robison rejects as unsatisfactory the legal conception of delinquency, " Both as a distinguishing description and as a tool for statistical measurement " (p. 204), she finds Children's Court figures an unsafe guide to the extent of delinquency, she is of the opinion that it is as yet unwise to posit a correlation between economic or ethnological factors and juvenile delinquency and she holds that there is a grave risk in comparing area rates of delinquency—"Differing behaviour on the part of parents and of authorities confronted with a troublesome child may be as much a modifier of neighbourhood rates as different proportions of troublesome children " (p. 4).

It is difficult to refrain from quoting some of the paragraphs. Particularly is Chapter III on "Tools and Definitions" to be commended (pp 21-36) for here is found the crux of the whole matter—the influence on delinquency figures of the tremendous variance which is found in customs and habits of thought, as well as in methods and extent of operations of care agencies, from one group within a community to another. Valuable references are made to the different treatment accorded irregular behaviour among people of the several economic levels, to the extent of police surveillance in congested areas compared with the suburbs, and to the concept of poverty as a state of mind rather than lack of material income

The book is yet another indication of the fact that sociologists are looking far more deeply into causative factors than has been usual hitherto, and that there is an increasing scepticism regarding the validity of previously accepted measures of juvenile delinquency Moreover, the problem is now being attacked from the more fundamental aspect of the responsibility of adult society for the production of delinquents Unfortunately, the allied problem of treatment to which brief references are made is complicated by the fact that Society has not yet made up its mind whether it wishes to retaliate for injury to public welfare, to incapacitate the delinquent from committing further injury, to deter others, or to rehabilitate the offender If the latter aim is to be paramount much sympathy will be felt with the writer's incidental criticisms of institutional treatment

If one may venture a criticism of arrangement, the book would have been more readable for those who are not so much concerned with the specific problems of New York City as with the problem of juvenile delinquency in general had the authoress divided the book into two sections, one elaborating her general thesis and the other demonstrating the source of her conclusions in the study of her statistics As it is, the book is an exposition of a study of fifty-one statistical tables in the text and forty-four pages of statistical appendices, the study of which requires more patience than the reader mainly interested in the general thesis of the book will wish to expend On the other hand, there is wisdom in claiming no more than that the book exposes the conditions which distort an approximately inclusive measure of the extent of delinquency in the particular community of New York City, and the reviewer's criticism may be a further indication of man's incurable love of generalizations W L C

Ability and Knowledge By F C Thomas With a Foreword by C. Spearman and an Appendix by Elsa Walters (Macmillan and Co, pp. 338 15s)

The author of this book gives as its main purpose " an attempt to place before the novice in psychological study a simple yet adequate authoritative account of the theories associated with the name of Professor Spearman, but it also offers the more advanced student a fairly comprehensive compendium of the most important findings of what has come in recent years to be known as the London School " In addition, in the later part of the book Mr Thomas examines a number of criticisms which have been made of Spearman's work, and estimates its value in general psychology In these aims Mr Thomas has been most successful Teachers of psychology have, I think, long felt that while it was important for students to know a good deal of Spearman's work, his own books were difficult except for the advanced student. In the book before us Mr Thomas has made the way as plain as could be expected In the first part he deals with individual differences in ability and gives a lucid and helpful exposition of the two factor theory The next part deals with personal variations in ability, followed by a discussion on the well-known doctrine of eduction of relations and correlates, and the application of these principles to perception, memory, imagination, and so forth

The more detailed mathematical and statistical work is relegated to an appendix The arrangement of the book is excellent and everything is done to facilitate the student's grasping of what must always remain somewhat difficult material But the book is more than a mere outline of Spearman's work Mr Thomas has brought to it his own way of approach, his own lucid exposition, and at times he diverges somewhat from Spearman's own point of view. In addition, the book has the advantage of including the results of a number of more recent enquiries which have somewhat modified Spearman's own position since the publication of his books In general, the tendency seems towards the admission of more group factors, and at times it looks as though Mr Thomas should have gone further For example, how can a specific ability S be *partially* shared by a number of talents (p 52)? Surely this implies that this S includes at least two independent elements

The many references to further reading will be useful to the more advanced student, and even he will find it a good plan to read this book before approaching Spearman's own work C W V

A Guide to Mental Testing By RAYMOND B CATTELL (University of London Press, 312 pp., 10s 6d net)

The author describes this book as intended " for psychological clinics, schools, and industrial psychologists " It is a valuable survey of an unusually wide kind, dealing with many types of tests, questionnaires and so forth Tests of general intelligence, indeed, only occupy the first chapter, after which the author goes on to deal with tests of special aptitudes (mechanical, musical, artistic, dexterous), then with attainment tests, scholastic and general, and " gauges of interest and attitude " The major portion of the book, however, and probably the most useful to the psychological student, is the last two chapters, dealing with tests of temperament and disposition, "probes of character," and the structure of emotional adjustment

Admittedly these deal with much less dependable tests They refer to work which is hardly more than a preliminary exploration of very difficult and complicated problems. In view, however, of the wide literature which has already developed on these topics it is most valuable to have this brief and well documented survey of some of the main findings and a guide to the kind of tests given.

Dr. Cattell discusses, briefly and lucidly, a number of the general psychological points that are raised, to which the tests are relevant, but that is not the main purpose of the book. He is, perhaps, unduly sanguine about the reliability of some of these tests of temperament, disposition and so forth, and as to his types " surgent " and " desurgent." But tests of general intelligence had also to pass through a crude experimental stage. Provided this provisional nature of these temperament and type tests is borne in mind it is all to the good that various tests described here should be more widely used and experimented with In view of the main purpose of this book, however, it seems clear that it is rather for the laboratory teacher or the tester in the clinic or at school who has already considerable knowledge of intelligence tests Dr Cattell's criticisms of the Binet tests are of course sound when considered merely as tests of intelligence But as a means of beginning a training in the use of tests their value is I think still high. For the more advanced student this book is a most welcome guide

Psychology : a Factual Text-book. By E G BORING, H S LANGFELD, and H P WELD (Chapman and Hall, 555 pp , 13s 6d)

With the assistance of some twenty collaborators the authors of this book have tried to give " a generalised statement of fundamental facts in so far as generalisation is possible at this time " They have of set purpose avoided theoretical discussion and controversial points They point out that the subjects treated have a very unequal amount of space given to them They give as their reason that psychological knowledge of a fairly definite kind based upon experiment is much more extended and exact in some fields than in others Hence we are prepared to find that the first 300 pages of this book are devoted almost entirely to subjects formerly covered by the term " physiological psychology " On such topics a condensed statement of general results is a relatively easy thing to give , and this book will provide an excellent guide to the main experimental findings and to further reading

The same applies though to a somewhat less extent to the succeeding section dealing with the learning process and imagery. When, however, we come to such topics as pleasantness and unpleasantness, emotion, action and thought, the actual facts established are so dependent upon the setting of the experiment, and the results are sometimes so much matters of surmise and so intimately connected with psychological theory, that this type of treatment is bound at times to seem somewhat cursory and an attempt at abbreviation may be sometimes misleading Certainly it seems to result occasionally in expressions which are hurried or obscure For example (p 393), " not only does pleasantness reinforce learning, but unpleasantness hinders learning as well For this reason either reward or punishment can be used in the establishment of learning "

For these reasons the later chapters we should regard as useful rather as a preliminary introduction than as a final summarised study

Psychology of Learning: a Text-book in Educational Psychology, by ROBERT A DAVIS. (McGraw-Hill Publishing Co, Ltd., xii+pp 489 18s.)

This book is intended as a text for both undergraduate and graduate students in departments of education and psychology

Certain chapters presuppose some knowledge of psychology as well as of scientific technique and statistical devices, although references to standard works in technical chapters should enable the student to obtain further information if needed

There are nineteen chapters These cover an immense field and incorporate a very large number of the better studies, and several promising theories on the psychology of the learning process The aim has been to make the book rest solidly upon experimental work, and many different investigations are briefly reviewed and critical suggestions are offered It is hoped that school people in particular will be able to use in a practical way some of the conclusions derived from objective investigations and may be stimulated to conduct studies of their own It is pointed out that more studies are required which deal with children who range from kindergarten stage through the adolescent period

To some extent the manner in which the topics are related to learning and teaching in school may be illustrated by reference to Chapter XV It deals with modes of presentation, and there is a discussion of the efficiency of various modes as suggested by laboratory and schoolroom investigations A section is given to visual aids, and the use of slide and motion picture is compared with lecture and other verbal methods of classroom instruction, and this is followed by a section which deals with the sound motion picture as a teaching device, and another summarizes findings relating to the efficiency of graphic, tabular and textual modes of presentation

The chapter ends with a summary of the relative efficiency of these modes in differing circumstances There is a great deal of interesting material and very many useful suggestions in this book for the experienced teacher as well as for the teacher in training or the student of psychology

Student's Guide for Beginning the Study of Psychology By W L. VALENTINE, J H TAYLOR, K H BAKER, and F. N STANTON. (Prentice-Hall, Inc, New York, 1935 267 pp $2 35)

This is a comprehensive guide in experimental psychology, descriptive of experiments which may be carried out by beginners in the subject Each student is expected to possess a copy, and to work through the 117 exercises which it contains The majority of these experiments require little or no apparatus, the others use apparatus such as is to be found in most laboratories, chronoscope, galvanometer, ergograph, etc The experiments are clearly described under various heads such as problem, material, method, directions to subject or experimenter, directions for recording data, etc. The students are introduced to statistical methods throughout the course, and correlation formulæ are explained in an appendix which also contains norms for some of the experiments in the text as well as material for others

Dockeray's *General Psychology* (revised) is referred to throughout the text, although additional reading is also given for some of the exercises

A new feature is introduced in this revision of the *Guide*, namely the introduction at intervals of four "Technical Vocabulary Matching" Tests These are to ensure that any advance in an understanding of psychology is not being impeded through a lack of the technical vocabulary peculiar to psychology as a science Progress record cards are also inserted so that from time to time the student can "plot his mastery of the material"

The chief feature which strikes a reviewer is the overwhelming quantity of the material One feels that the student, particularly if a beginner, will feel swamped For this reason, some of the experiments suggested could, without detracting from the value of the book, be omitted The grading of the exercises, in seeming order of difficulty, is also open to question Some of those near the beginning of the course seem to require more introspective material than the novice in experimental psychology is capable of

Many of the experiments are ingenious, and the *Guide* will be undoubtedly useful in suggesting experiments to those in charge of laboratory courses Whether it is suitable *in toto* for students in this country is more difficult to decide.

M C

The Measurement of Interests By DOUGLAS FRYER (Harrap and Co., 1936 xxxvi+488 pp. 10s. 6d net)

This book is a comprehensive survey of all the methods—tried, discarded, improved upon, or adopted, in America—of measuring interests during the decade 1920-30. "Interests" is here used in a highly technical sense, connoting "one of the five aspects of personality whose measurement has begun," and carefully distinguished from attitudes, motivations, emotions, and abilities, all of which "are separate aspects of mental life" Similarly the various methods of interest-measurement are carefully classified and distinguished—subjective methods from objective, quantitative from qualitative, clinical from experimental, genetic methods from "cross-section studies"

The purpose of the movement here surveyed was originally the prognosis of vocational or educational efficiency and success But as the movement developed, and the nature of what was being measured was defined (interest is now, apparently "that which is measured by interest tests"), its goal changed At present interest-measurement seems to be "more important for long distance achievement than for short," and more important for "individual feeling—adjustment"—for happiness and morale—than for anything else. Herein lies the interest, for the educator, of the movement under discussion.

The author's attitude to the field—at once restricted and enormous—which he surveys in such detail, is open-minded and critical. He is both sceptical and appreciative of the methods hitherto used and the results hitherto obtained He realizes that the attempt to make measurement scientific may serve also to make it barren of results, and that when we have, as he puts it, "removed from the definition of interests all those activities which cannot be measured," we may also have removed most things of educational importance. This attitude on his part will go a good way to reconcile the English reader to the paraphernalia of questionnaires, inventories, scoring blanks and keys, ratings, correlations, "validations," interest histories, and "own stories," which he is invited to consider

As regards general theory, the most significant feature of the book is probably its incidental elucidation of the relation of "interests" to innate ability on the one hand and to environment and training on the other This problem underlies the whole book, rising to the surface at intervals

M.P

Motivation of Behaviour By PAUL THOMAS YOUNG. (New York John Wiley and Sons, Inc; and London Chapman and Hall, Ltd, 1936, pp xviii+562, plates and text figures. 20s net.)

We can commend this book warmly, our chief complaint being that the author has been too modest in stating his own views and criticisms "Speculation and theory have been strictly subordinated to the presentation of laboratory findings," and the impartiality which he says he has tried to assume is so complete that the reader longs to hear Professor Young's own voice, since he has much to tell us But he has admirably carried out his intention to provide students with an adequate summary of the work done in this field, and at the same time he has organized into a book material which might have been no more than a compilation His use of his sources is clear and concise, the statement orderly and economical, so that students approaching this field will find themselves heavily in the author's debt In the earlier chapters the white rat is more prominent than man, and there is an inevitable decline in the clarity and certainty of the analysis when man comes into his own The author is throughout alive to the differences of mice and men, and cautious in extending an argument from one to the other But to English ears the later chapters will seem thinner than they need have been The criticism of psychological hedonism is inadequate, and in a long and careful treatment of " will " we find no reference to the views of Ach and Aveling concerning the specific characters of volition We may admit all he says regarding the importance of verbal self-instruction in the direction of behaviour, and still feel curiosity concerning the actual moment of self-instruction But criticism of details will reflect the critic's environment, and weigh little against the solid merits of the book

A W W

Principles of Animal Psychology by N R F. MAIER AND T C. SCHNEIRLA (London McGraw-Hill Publishing Co , 1935, pp xiii+ 529 24s net)

As the writers observe in their preface, it is probable that in the near future a training in psychology which does not include a study of lower animals will be regarded as inadequate This tendency is shown in modern introductory text-books of psychology, and the advanced student of psychology is, of course, aware of the light which a study of animal behaviour and of child behaviour can throw on the behaviour of adult man The book suitable to serve as a sound and systematic and comprehensive text-book of animal behaviour is not easy to find, and this volume should fill a real need extremely well The exposition is clear, the book is well illustrated, and there is an extensive bibliography.

In Part I the eleven chapters are devoted to tracing the manner in which the basic behaviour mechanisms expand and become supplemented by new abilities The protista provide a starting point and the classes up to birds are examined

The six chapters of Part III are concerned with mammals (below man), and with the nature of modification in their behaviour, the final chapter being a discussion of higher mental processes, particularly reasoning and problem solving

The study of mammalian behaviour, where there is a shift of interest in the problems investigated, is approached in Part II by a treatment in three chapters of questions of "Natively Determined Behaviour," "Differential Reaction to Stimuli," and " Neural Mechanisms in Behaviour."

Educational Psychology Edited by C E SKINNER. (New York Prentice-Hall, Inc , pp 754 $3 20)

This volume is the latest addition to the Prentice-Hall Psychology Series The Editor, Dr Skinner, of New York University, has gathered around him a team of twenty-five educators and psychologists from twenty-two different colleges and universities Each writer contributes a chapter on that branch of educational psychology in which he is an acknowledged authority The Editor allowed freedom to each contributor and his editorial work, beyond choosing his team and selecting topics, was in arranging the chapters in logical sequence The psychological viewpoint is therefore eclectic, but each writer has emphasized fundamental principles

To outline the contents of such a large and interesting volume in a short review is obviously impossible, but sections deal with Growth , Learning, Individual Differences and their Measurement , Adjustment and Guidance

The experiment of issuing an elementary text-book in educational psychology on these co-operative lines seems to be amply justified , the field usually covered in such a text is adequately dealt with in this volume , a summary, selected references for further reading, and questions for discussion follow each chapter The standard reached by the different chapters varies, but, within the limits imposed by the scheme, a high level of achievement is attained

Social Psychology by R T LA PIERE AND P R FARNSWORTH (New York and London McGraw Hill Publishing Co , Ltd , pp. 504 21s)

It is interesting to note that the authors of this large volume are respectively Assistant Professor of Sociology and Associate Professor of Psychology at Stanford University They tell us that " Social psychology is the study of the processes by which the human animal acquires from social experience those behaviour characteristics which make him a socialized human being" Their feeling is "that social psychology is destined to be more than a bridge connecting psychology and sociology—that it may become an independent structure from which both of them may profit"

The book is divided into five sections dealing with the Nature of the Individual and of Society, the Processes of Socialization; the Human Personality, Personality Differentiations, and the Situational Nature of Social Behaviour.

Much ground is thus covered, but necessarily the ploughing cannot be very deep. The book is pleasantly written, but many chapters are provocative rather than conclusive. Each chapter is followed by a helpful appendix with many useful references for further reading

It forms another large and interestingly discursive volume on "Social Psychology," but is conclusive evidence that, scientifically, social psychology is still in its infancy

Education for Citizenship in Secondary Schools issued under the auspices of the Association for Education in Citizenship. (Oxford University Press, x+267 pp, 4s 6d net)

This book is designed to show how the life of the school and the subjects of the curriculum can be made to further the aims of the Association for Education in Citizenship It contains a foreword by the President of the Board of Education, a preface by Sir Henry Hadow, a section of four chapters on the aims and theory of education for citizenship, a section of ten chapters on methods, each dealing with a subject in the secondary school curriculum, a section of two chapters on clear thinking, a section on broadcasting and the teaching of citizenship, and four appendices There are over twenty contributors to the book, including some of the most eminent scholars and teachers in the country

The section on methods, each chapter of which should be read in the light of the sections on aims and clear thinking, shows that every subject in the curriculum can be dealt with in a way that may promote conscious citizenship It is impossible to attempt to evaluate the individual contributions here, but attention must be drawn to an important merit which they have in common, namely, the revelation of opportunities of solving the urgent problem of co-ordination of subjects.

The Psychology of Human Behaviour by JOSEPH H GRIFFITHS (London Geo. Allen and Unwin, Ltd, 1936 12s. 6d)

In plan and contents this book reflects the experience gained from a dozen years of teaching elementary psychology to college students, and it can be recommended to any student who desires to get from one volume a reasonably comprehensive and not too detailed view of the general field of psychology.

It is well written and easy to read, and the emphasis is on a functional point of view It aims at presenting psychology as a vital human interest in itself and as a basic equipment for various professional interests Assignments of laboratory exercises are included and supplementary readings are suggested at the end of each chapter Perhaps it is noteworthy that the lists of books are not by any means confined to American writings The six parts into which the book is divided cover the following topics What Psychology Is, the Psychology of Learning, the Psychology of Feeling and Emotion, the Psychology of Thinking and Imagining, the Psychology of Perceiving, the Psychology of Personality

The Psychology of Learning: by E R. GUTHRIE (Harper and Brothers, pp 258 $1 50)

As the writer tells us in his preface, this essay is written in terms of behaviour, and is an exploration of the field of learning to discover the nature of the phenomenon of association and the limits of its use in the explanation of learning Mind is regarded as a mode of behaviour, namely, that behaviour which changes with use or practice, behaviour, in other words, which exhibits learning The ability to learn is the ability to respond differently to a situation because of past response to the situation, and this is what distinguishes those living creatures which common sense endows with minds Changes in behaviour which follow behaviour are called learning The term " learning " is, however, reserved for the more lasting effects of practice

Many problems are brought forward and discussed in an interesting, and what will be to many readers in this country, a somewhat unfamiliar manner That in itself ought to commend the book to those who wish to see how the behaviourist, or, at least, one behaviourist, deals with a topic such as learning in man and lower animals

Psychology By GLENN DEV HIGGINSON (New York The Macmillan Company, 1936, pp xiii+646, and text figures 12s 6d)

The length of this book is disproportionate to the amount of information which it gives For a text-book it is too argumentative (and too insistent upon the author's point of view) and not sufficiently thorough for a treatise It is written in a somewhat wandering style with many unnecessary sentences and repetitions It therefore fails in clear presentation of its material But behind the cloud of words there is a reasonably comprehensive array of factual knowledge, organized in relation to a functionalist standpoint There are good bibliographies of American and English work If the book had been pruned it would have been a good text-book, for the author sees psychology as a very human and live science A W W

Bibliography of Social Studies Compiled by the Association for Education in Citizenship (Oxford University Press xi+111 pp 3s 6d)

The purpose of the bibliography as set out in its Preface is " to assist teachers and students in all kinds of schools, training colleges, and adult classes who are making a study of the modern world through the social sciences, history and geography " Sections on logic and psychology are included " for the benefit of those who wish to use them for the development of clear thinking in the foregoing subjects "

Each book mentioned is accompanied by a descriptive and critical note, and the books are graded in groups suitable for different classes of readers.

The bibliography should amply fulfil its purpose and also justify the claim that it should be found useful by the general reader.

Straight and Crooked Thinking By R H. THOULESS (Hodder and Stoughton, pp 284 3s 6d)

This book has, through an oversight, only come to us for review very late, and it is already fairly well known , but it is too good a book for us to miss commending it warmly to those readers who have not yet come across it

It might well be called " Logic without Tears," or, indeed, " with some Laughter." It is full of concrete examples of various kinds of fallacious reasoning, tricks of suggestion, pitfalls in analogies, vagueness, prejudice, and so forth It would be an excellent book for a sixth form to read, or for students in training colleges If a general training of reasoning can be given, this book, I think, comes very near to providing it

Biotypologie et Aptitudes Scolaires Une enquête sur un groupe d'écoliers parisiens · By H. LANGIER Edited by TOULOUSE and Mlle D WEINBERG (Conservatoire National des Arts et Métiers, 292, Rue Saint-Martin, Paris—IIIe 25 fr)

This report originated from the belief that a " biotypological " examination of individuals is advisable, even necessary, whether the end in view be medical and psychiatric, therapeutical or preventive measures, educational organization and guidance, or vocational guidance and selection

It presents the methods and results of a " biotypological " examination of 100 boys from a primary school in Paris, of whom 40 underwent the complete series of tests. The authors fully realize the limitations imposed by such a small group, but they published this report mainly to explain the method of approach and to indicate its results, which will have to be verified by further experiment

This "biotypological" examination consisted of the following sections·

(1) Inquiry into family history—including the child's relations to his parents, brothers and sisters, schoolfellows, and friends.
(2) Anthropometrical examination
(3) Morphological examination
(4) Sexological examination.
(5) Chemical examination.
(6) Physiological examination
(7) Psychological examination
(8) Psychiatric examination

Each section is described in detail, the results for each child being given in full

The authors also discuss the problem of scholastic efficiency and its measurements, and they give correlations between certain physical and psychological characteristics and scholastic attainment These correlations cannot be regarded as significant in themselves owing to the smallness of the group, but they do give interesting indications of systematic variation, and the authors conclude "en toute prudence" that for their group of subjects

(1) The important physical characteristics correlate negatively with scholastic attainment
(2) This correlation seems due, if not entirely, at least mainly, to the factor of "age"
(3) Even after the influence of age variation has been eliminated by partial correlation there still seems a tendency to negative correlation between certain physical characteristics and scholastic attainment

In the last chapter of the report are discussed practical suggestions regarding the selection of pupils for secondary schools The authors suggest that a battery combining tests of psychological and physical characteristics is manifestly superior to a battery consisting of various mental tests alone They also suggest that the age factor must be taken into consideration in the "note synthétique d'admission," *not* as a factor limited to a minimum and maximum but as an appropriately weighted contributory factor (whatever the pupil's age).

The whole report makes most interesting reading and points the way to many other problems for investigation G A A

Preventing Crime. A Symposium edited by SHELDON and ELEANOR GLUECK (McGraw-Hill Publishing Co, Ltd., London pp 496. 24s)

Evaluative Research in Social Work. By ELEANOR T GLUECK. (Published for the New York School of Social Work by Columbia University Press English Agents, Oxford University Press pp. 27 1s 6d. net.)

Following their previous valuable contributions to the study of clinical treatment of juvenile delinquents, this Symposium edited by Sheldon and Eleanor Glueck is of especial interest In general, the text expounded by the work is that crime prevention programmes should be concerned with the problems of children rather than with problem children In an interesting parallel with medical science the compilers suggest in their introduction that as an exact knowledge of the aetiology of a specific disease has not always been an essential preliminary to successful control so it may be possible before the causal problem of Juvenile Delinquency has been solved to discover empirically methods of control

Delinquency is here regarded primarily as a problem of adjustment to the social values and modes of thought of the group The thesis of most of the contributors is that given a reasonable environment with opportunities for the constructive development of personality and use of innate aptitudes the majority of children will respond by a satisfactory adjustment to the social values of the community *Preventing Crime* contains accounts of twenty-four experiments which are being made in the United States of America to provide the environment and opportunities for this adjustment The methods employed, some of which have passed beyond the experimental stage and have become permanent institutions in certain localities, are grouped under six main headings

Firstly are the co-ordinated Community Programmes—the sociological as contrasted with the individualistic approach to the problem " The essence of a co-ordinated community programme seems to be the recognition of the inter-relationship of the various elements in community life the strengthening of constructive elements and weakening or removal of others."

The aim of those interested in this method is to awaken the public conscience to the problem of juvenile delinquency and to work through a central organization in which the co-operation of many diverse aspects of communal life is sought

Secondly, the strategic importance of the schools is recognized and accounts are given of various features of the schools attack on delinquency Probably the most interesting to the educationist are those dealing with attempts to give individual treatment to backward, retarded and problem children either by the provision of special classes or by the employment of visiting teachers to bridge the gap between the school and the home

Thirdly, two experiments are mentioned in which the rôle of the police as preventors rather than detecters of crime is given prominence Fourthly, an account of the work of some pioneer institutions for the care of delinquents is given—the provision of a controlled environment for a period prior to re-entry into normal society Fifthly, methods of dealing with delinquents and pre-delinquents such as child guidance clinics and the Big Sister Service are mentioned, and lastly, the importance of recreational programmes is emphasized by the inclusion of a section on boys' clubs and settlement projects

Of real interest to sociologists is the assumption underlying practically every contribution that "Juvenile delinquency is a social phenomenon for which the child himself is not responsible," or, from another contributor, " The underworld is always a response to conditions in the upper world " This aspect opens up problems which are outside the scope of the book but if it is granted that the mind's debt to externality is the determinant of the measure of adaptation to the body of tradition and of customary methods of thought and attitude of mind which in their expression constitute our social heritage then the approach to treatment presented by certain of these experiments is soundly conceived

English readers will find the study of the various methods of attack on juvenile delinquency provocative and suggestive—a similar up-to-date symposium of experiments in this country would be of real value

Evaluative Research in Social Work consists of a paper presented by Eleanor Glueck at a meeting of the Association of the New York School of Social Work It is a reasoned plea for evaluative research work in the field of criminology, an indication of the scope of the problem before the research worker and a claim for the practicability of the experimental approach It is also a sane and logical account of the aim, and the limitations, of intelligent social work W L.C.

Tests of Ability for Secondary School Courses By FRANK M EARLE (University of London Press, Ltd, 1936, pp 138 5s)

For several years Dr Earle carried out studies of the marks obtained by ordinary class groups in a secondary school His figures suggested the hypothesis that the abilities expressed in marks in school subjects are less related at the later stages of school life than they are at the first year stage. The influence of group factors—such as appear in English and in mathematics—appears to be less in the first year than in subsequent years

In this book Dr Earle describes his attempts to develop tests which would help a school administrator to advise both a course of studies and a suitable vocational aim at the commencement of a secondary course of studies. The author fully realizes the magnitude of his task and would be the first to admit that most of the problems are still to be solved. But he does claim, however, that his tests have possibilities of usefulness (*a*) the " words " test may indicate ability for English subjects and modern languages, (*b*) the " algebra " and " geometry " tests will indicate ability for mathematics and engineering (including technical drawing), (*c*) the "science" and "algebra" tests in combination will indicate ability for science subjects generally, and (*d*) the "science" and "geometry" tests in combination will indicate ability for "technical subjects"

The tests appear in full in the appendix, and are thus made available for school administrators and others who wish to test their efficiency

I must point out that Question 7 on page 107 appears to me unnecessarily vague and confusing If so, then Questions 8, 9 and 10 are also implicated I would further point out that the table of correlations, which appears on page 6, does not make it "possible to forecast the final success of a pupil on the basis of his success at an earlier stage ." The coefficients are obviously not high enough for this

In Chapter I the author, who is Principal of the High School, Kirkcaldy, stresses the value of studies of small groups such as he, himself, has so instructively employed

In Chapter 2 the researches of Kelley, Rogers, Allen and King are briefly discussed and compared with the author's own researches

Chapter 3 gives an interesting account of the diagnostic value of special tests

Chapter 4 discusses the validity and reliability of the tests.

Chapter 5 gives a brief summary of the results

The book should prove useful to those psychologists who are now concerned with similar problems It may be confidently predicted that the introduction of modern methods of "differential diagnosis" will soon throw much light on this field In the meantime, the pioneer attempts of Dr Earle and others deserve every commendation.

LL W J

The Scientist in Action: a Scientific Study of his Methods by W H GEORGE (Williams and Norgate, Ltd 1936, pp. 355, 10s. 6d)

This book deals with the common similarities in the plans of action and the results of all kinds of scientific research, biological or non-biological, academic or industrial.

There are four main sections treating respectively of the scientific outlook, getting scientific facts, arranging scientific facts, conclusions A classified bibliography is added. It is short but useful The discussions are confined to devices of research technique applicable in all the sciences, and no philosophical treatment is given to any of the subject matter Though scientific research is treated as a problem in human action, and though it is claimed that the scientist himself must be taken into account as he is a disturbing influence on the phenomena studied, the view is taken that science and philosophy are logically completely independent It is not suggested, however, that either philosophy or science is illogical

The idea of the research worker as a pure-reason machine is abandoned for the idea of a biological unit reaching to, and acting upon, an ever-changing environment There is nothing new to the psychologist in this idea, but it is new for it to appear with such candour and vigour in a book on scientific methodology.

It is pointed out that there is nothing in current research technique which in any circumstances enables even the most brilliant scientist to determine "shouldness" when questions are asked in regard to certain problems in civilization, and also that if the scientists' methods are to be applied to such problems men able to make the applications must be found Scientific method has never been tried in major social problems Traditional methods are still failing after centuries of trial The pertinent and penetrating last chapter on the future of experimental research should be read by all who are sensible of their social responsibilities At present civilization uses scientific facts but not scientific methods in practical affairs The only untried method which has been proposed for enabling man to enjoy more of the blessings of applied science with less of its curses is that both the results and the methods of science should be directed to social uses

The book can be highly commended not only to the notice of all science teachers in school or in university, but also to all teachers and thinkers who wish to teach and to think scientifically.

There are many provocative and hard statements, e g , that our present methods of teaching science are ill-adapted to favour the learning or practice of scientific method even in a particular science, with which, unfortunately, we are compelled to agree

F M A

Les Enfants Difficiles et leur milieu familial by MARGUERITE LOOSLI-USTERI (Delachaux et Niestlé. Neuchatel et Paris, pp 233 4 francs 50 cents)

For over twenty years there has been a "Consultation médico-pedagogique" in connection with the "Institut J J Rousseau" at Geneva, under the general control of Dr Claparède, but only in this book do we have at last a summary of the findings of this clinic, and this only relates to the last four years, the reason being that so many different doctors and others have been in charge of the work that there has been a lack of continuity This Dr Claparède explains in his excellent introduction The main body of the book is devoted to an analysis of the types of cases and the frequency of the relation of these cases to the various kinds of circumstances Thus the influence of the composition of the family, the position of the child in the family, and the particular difficulties, such as opposition to discipline, thieving and so forth, are discussed Perhaps the most striking thing in the whole discussion is the generally objective approach, the absence of attachment to any particular theory or view of childhood and development, and an absence of dogmatism The number of children surveyed is 228, of whom 162 were boys The age-range was from two to seventeen, but the great majority were between the ages of five and thirteen or fourteen When the various types of difficulties are separated the numbers are, of course, small for generalization, but each contribution of this kind adds to the completeness of our statistics Even this small group seems to be enough to rebut the assertions of Adler as to the only children being difficult because they are spoilt On the contrary, the majority of these seemed to be rather hardly used Furthermore, the "Joseph" type was never met and the position of the youngest, when a difficult child, was never the sole cause of the trouble, there were other factors than spoiling The relatively small number of sexual matters is also notable

One of the most useful aspects of the book will be the comments upon the effects of different types of homes,—separated husbands, fatherless children, and so forth

The Origins of Love and Hate By IAN D SUTTIE, M D (Kegan Paul, Trench, Trubner and Co, Ltd, Pp. 275. 10s 6d)

In this well-written book the late Dr Suttie set forth his criticism of the Freudian psychology and his own substitution for several of Freud's main fallacies, as he regards them The fundamental thing in human nature, according to Dr Suttie, is the craving for companionship, the basis of innate love, which may be entirely dissociated from sex This makes the infant primarily a social and not a sexual being and emphasizes the importance of the mother as against the father The mother's too early withdrawal from the child, before it acquires other companions and interests, he regards as a serious cause of anxiety

Dr Hadfield in a brief preface expresses not only his appreciation of Dr Suttie's book but his general agreement with the views he puts forward Not content with diverging from Freud on such topics as the Œdipus complex and jealousy of the boy towards his father, Dr Suttie carries the war into the enemy's country still further, especially in the chapter headed "Freudian Theory Itself a Disease" Here he applies the psycho-analyst's idea that theories and views may be unconsciously determined, to Freud himself It explains, Dr Suttie argues, Freud's indifference to love as opposed to sexual love and his preoccupation with the father to the exclusion of the mother (This latter point certainly seems hardly correct) He points out that in addition to jealousy of the boy towards his father there is what he names the "Laios jealousy"—of father towards the child, "Zeus jealousy"—the jealousy of the male as regards the female's capacity for producing children, a jealousy which appears among certain primitive peoples, and "Cain jealousy"—which he regards as the most important of all socially

Though these main criticisms of Freud seem to be well substantiated Dr Suttie's own treatment of early infancy seems to be at times too intellectualized His criticism of some of the earlier psychologists also indicates that he was not familiar with any wide field of general psychology, and some of his arguments suffer for that He seems also to underestimate the importance of mere maturation On the whole, however, this is a valuable, stimulating, and will probably prove also, a most provocative book

Education of the Slow-learning Child · By C P. INGRAM. (G G Harrap and Co, Ltd pp 418+xii 7s 6d)

Miss Ingram's book is written specifically for American teachers, who are still being asked to teach classes undifferentiated in mental ability She has to plead for school reorganization and a variety of curriculum, which we have already achieved in England under the Hadow Scheme At the same time her book achieves the useful purpose of expressing with very simple clarity the problem and many of the fundamental principles in the education of the backward child "The schools must consider seriously the problem of utilizing to much greater effectiveness the long period of time the handicapped child is spending in the classroom."

Miss Ingram insists on the necessity for a different, rather than a curtailed, curriculum, and upon the importance of the Project Method for the arousing of real interest She would combine with this informal grouping of doing and making activities, regular practice periods in the tool subjects, a daily routine directed to the formation of good habits of morals and hygiene, and much enjoyment of physical training, games, and music.

There are highly detailed descriptions of projects carried out in some schools in New York State an interesting analysis of the physical, social, and mental traits of retarded children of junior school and of senior school ages, and a list of American children's books which we could profitably add to the variety of stories in English school libraries

On the whole, Miss Ingram repeats much that has already been written on her subject in this country, but writes with a simplicity which would make her book a useful supplement to the school-practice teaching of training college students.

J G MACG

Etudes docimologiques sur le Perfectionnement des Examens et Concours (Conservatoire National des Arts et Métiers. 292, Rue St. Martin, Paris, pp. 88, 15 fr.)

Extensive enquiries into various aspects of examining have been conducted in France under several auspices The publication now before us is a joint contribution from five people who can be credited with considerable skill and experience in their study of the problems raised in examinations They seek a technique which will make examinations much more effective and less open to criticism than hitherto

The papers are too technical to admit of a full analysis in limited space, but in view of the more recently published full report of the investigators who have been at work on the Baccalauréat under the encouragement of the Carnegie Trust, they are worthy of close attention

Modern social conditions necessitate two principal classes of examinations, one for testing attainment, the other for ability Examinations may serve many purposes, secondary perhaps to these, but nevertheless important in a sense that varies with different examiners Hence a reason why special problems occur such as can be solved only by a definite technique to which the name Docimology is given

The contributors of the "Etudes" have dealt faithfully with the selection value of a school certificate as compared with "tests", the effect of subjective factors in marking is discussed in two papers, two others are devoted to "docimology", a sixth deals with physical and mental qualities in relation to intellectual standing, and the final article is a comparative study of the marks obtained by men and women candidates for the Certificate in Higher Studies in Science at the University of Paris.

Taken in conjunction with other recent publications on examining, this brochure will be found to be informative and suggestive.

A P B

Thomas George Tibbey: a Lecture in his Memory By P B BALLARD. (Oxford University Press 1s)

This is No 8 of the series of Studies and Reports of the University of London Institute of Education

The National Association of Head Teachers have placed funds at the disposal of the Institute to provide from time to time a lecture towards the advancement of research in education and in memory of the late T G Tibbey No one could have been more appropriate for the first lecturer than Dr Ballard, and this lecture is a worthy memorial to Mr Tibbey, who was a pioneer among head masters in his work for the extension of research, and particularly for bringing to the ordinary teacher a knowledge of researches and encouraging him to undertake himself simple work in the way of testing and so forth In a sense too it includes some delightful reminiscences of the history of the spread of the interest in scientific educational research, in which the author himself has taken such an active part

Those who, like the reviewer, knew Mr Tibbey only slightly, will feel even more keenly after reading this lecture the great loss that education suffered at his untimely death.

C W V

The Use and Interpretation of High School Tests by H A GREENE AND A N. JORGENSEN (Longmans, Green and Co, 1936 pp 614+xxvi 15s)

The earlier work of these authors, namely, "Educational Tests," has now been divided into "Elementary Tests" and "High School Tests," to serve the individual needs of the elementary and the high schools This volume is not merely a reprint but a revised and expanded treatment of the subject, and provides a very valuable text for those concerned in secondary education. There is, of course, overlap with elementary education, so no doubt many who read one of the volumes will be eager to read the other

The essential principles of measurement in secondary school education are discussed in a practical way, and in particular attention is paid to making clear what tests are, what they do, what they do not do , the different kinds ; their construction, standardization and use , selection ; interpretation of results and their place in diagnosis and remedial teaching The reader is introduced to a good supply of tested material specially relating to each school subject, as well as to tests of general intelligence, personality and aptitudes An appendix provides lists of test materials and names of distributors and publishers of tests mentioned in the book There is a glossary of terms used in a somewhat special sense, and there are numerous exercises for students

Altogether, this excellent volume can be recommended wholeheartedly

Vision et Professions By R BONNARDEL, M D (Le Travail Humain Conservatoire National des Arts et Métiers Paris, 1936 pp 166. 25f)

As the title shows, Dr Bonnardel deals with the large question of eyesight in relation to employment, including not only the poor-sighted but also the blind or those who have only one functioning eye Chapters are also devoted to other ocular defects of vision, such as colour blindness, squint, visual fatigue, and to the dangers to sight arising out of individual forms of employment

While primarily intended for Works-doctors, there is much in the volume which is important to teachers and juvenile employment organizers, for the conservation of the eyesight of children while in school, and the choice of suitable employment on leaving school, are most necessary if industrial efficiency is to be secured

Dr Bonnardel discusses the difficult question of progressive short sight, and the value of classes for the partially-sighted children, the utility of which has recently been the subject of a special enquiry by the Board of Education The book is a valuable summary of the whole problem, and contains an extensive bibliography of the subject

G A A

Tests and Measurements in Industrial Education by L V. NEWKIRK AND H. A GREENE (New York John Wiley and Sons; London · Chapman and Hall, Ltd, pp 253, 13s, 6d.)

This volume is the work of the Director of Industrial Arts in the Chicago Public Schools and the Associate Professor of Education in the University of Iowa The writers have brought to their task the results of many years of experience and of much careful thought and critical examination of curricular changes and resulting developments in teaching methods The book is designed to meet the requirements of teachers and intending teachers in the department of industrial education, and particularly "to stimulate a renewed interest in the more adequate evaluation of student achievement by teachers of industrial education who have already had some experience with the work"

The book is clearly written, well produced, and should be very useful to American teachers engaged in the important work of industrial education

Secondary Education in New South Wales By W J ELLIOTT (38 pp, 1s 6d)

A History of Tasmanian Education By CLIFFORD REEVES (xvii+123 pp, 5s)

Australian Schools through American Eyes By JOHN FRANCIS CRAMER (59 pp, 2s)

These three books, published by Melbourne University Press in association with Oxford University Press, are respectively numbers thirty-eight, forty, and forty-two in the Educational Research Series of the Australian Council for Educational Research

Mr Elliott deals with the development of secondary education in New South Wales up to 1931, and concludes with a chapter on present conditions and future developments Mr Reeves is mainly concerned with primary education, it being intended to deal more fully with other aspects of Tasmanian education in a further volume. Each author has made a welcome addition to educational history

Mr Cramer's book is an instructive commentary on the centralized Australian system of education by a writer with a wide knowledge of the decentralized American system

Writing and Writing Patterns By MARION RICHARDSON. (University of London Press)

Two sets of hinged cards, five books of copies, and a teacher's book

The cards and books are carefully graded to suit the needs and ability of children of varying ages Pattern-work and the writing of letters and words proceed side by side In the teacher's book Miss Richardson carefully explains the fundamentals of her method The "patterns" are not intended merely as copies The poems and prose passages for copying are worth writing and worth remembering.

The writer has met many adult students who have been trained in their youth by Miss Richardson Her influence is immediately apparent in their handwriting—which is bold and legible, good in form and spacing—and yet always has individuality.

A Honey Bee and her Master By A. D'ARCY CHAPMAN (Oxford Basil Blackwell, pp 239, 7s. 6d.)

This book has been specially written to interest children of twelve and upwards in the study of insect and plant life generally by a detailed study of the bee A simple but comprehensive account is given of the life and work of the bee, and the most modern methods of its management are described The whole is admirably correlated with the teaching of elementary biology The book is beautifully produced and the delightful and original illustrations will be a joy to both teacher and pupil.

The Theory and Practice of Student Counseling by HUGH M BELL. (Stanford University Press and Oxford University Press, pp. 135 4s 6d. net)

Student-adjustment problems confronted by high school and college counsellors are tentatively classified into problems of school adjustment, health adjustment, vocational and occupational adjustment, motor and mechanical adjustment, social adjustment, home adjustment, emotional adjustment and religious adjustment, and these are discussed separately Also discussed is the use of techniques such as mental tests and questionnaires In particular, the form of questionnaire called the "Adjustment Inventory," which is used to obtain information as a basis for interviewing and counselling students, is described The practical aid thus furnished, and the limitations of the method, are explained

The Case Against Arithmetic. by E. M. RENWICK (London Simpkin Marshall, Ltd , pp 167 5s)

This interesting, stimulating and provocative book is written from the standpoint of a mistress who has taught mathematics for twenty-five years and who is seriously perturbed by some modern pronouncements upon the scope and function of school mathematics, particularly of junior school mathematics She has certainly made a serious indictment against the present procedure and gives considerable evidence in support of her indictment Teachers of elementary mathematics will be very interested in Miss Renwick's findings, and it is to be hoped that many other teachers may be encouraged to investigate as thoroughly as the author has done and to report their findings, whatever they may be, in an equally clear and decisive way

A Handbook of Hygiene for Students and Teachers. By CYRIL G EASTWOOD (Edward Arnold 6s.)

This book should prove of great value to all students and teachers Its physiological basis is comprehensive without being too detailed and yet is not so sketchy as to make readers lose interest in the subject of bodily structure The diagrams are very clear and simple The chapters on the disorders and diseases of school children are especially helpful, as is also Part VI, dealing with "Heredity, the Teaching of Hygiene, and the Law relating to the Schoolchild"

"The Vocabulary of Technical Terms" will prove most useful to those whose training in physiology and hygiene has not been detailed Altogether, a book to be thoroughly recommended and used M.E.H

Learn and Live· By W. E. WILLIAMS and A E HEATH (Methuen vii+271 pp. 5s. net)

Its sub-title, "The Consumer's View of Adult Education," indicates the scope of this book It is based on more than five hundred replies to an enquiry about their adult educational experiences made of students of Ruskin College and Tutorial Classes The result is an invaluable indication of what is involved in the efforts students are making, what they think about the return they are receiving, and what might be done to increase that return

The method of writing adopted, comment interspersed with copious quotations from the students, results in somewhat desultory reading, but the reader is more than compensated for any absence of flow by the degree to which he is enabled to judge of the integrity of the students' views and the validity of the judgments made thereon

Memoir of Caroline Garrison Bishop, of Edgbaston Froebel College, School, and Kindergarten By EMILY LAST (Headley Bros)

Friends of the early Froebel movement in this country will welcome this pleasantly-written tribute to one of its pioneers The younger generation of teachers will find inspiration Miss Bishop retired in 1906—but the descriptions of life in the Edgbaston Kindergarten might in many respects be the expression of an ideal which is only now being generally accepted

Drawing for Indian Schools: By D. D SAWYER (Published by Blackie and Son (India), Ltd. Rs 3-8)

Miss Sawyer has obviously both knowledge and understanding of children, and her book shows that she has had much experience in teaching them The stress she lays on allowing scope for the natural gradual development of control, observation, and expression generally, show that her approach is a sympathetic one I feel that too frequent use of the blackboard can be a danger, since it tends to stress the teachers' viewpoint rather than develop that of the child I would question the using of "stick men," as a method of developing figure drawing, and think that the pattern work shown tends to ignore the varying and individual character of different materials in the making of patterns

Barring these criticisms, the book holds many helpful suggestions, and should give useful guidance to teachers of this type of work

C R.C

Accidents and their Prevention By H. M VERNON (Cambridge University Press, pp. ix+336 15s.)

Accident causation has been the subject of anxious enquiry for many years, and a considerable number of reports has been collected But this book by Dr Vernon appears to be the first to make a general survey of the problems that are involved not only in the cause but in the prevention of the mishaps varying from trivial to fatal which have taken heavy toll of the population The book is one for the psychologist, the industrialist, and even for the man in the street, those who consult it will gain useful information and find that Dr. Vernon makes constructive suggestions for accident prevention The book is well got up and suitably illustrated

FOREIGN JOURNALS

Zeitschrift für Pädagogische Psychologie und Jugendkunde. Leipzig. November-December, 1936.

Contains papers on "Persönlichkeitsbegutachtung" and "Schüler-charakteristik," being attempts to transform school reports into some more understanding picture of individual characters Also "Kind und Metronom," by Dr R Leibold Experiments were made with children 3 to 6 years old as to their reactions to a ticking metronome At 3+ children are stimulated to action, but not in time with the metronome By 6 they can learn to beat time Intermediate stages show at 5+ when they wait for the sound of each tick and respond a fraction of a second later, and at 4 + when a quicker beat of the metronome does indeed stimulate quicker knocking but not yet in time

"Zur Gestaltung nationalpolitischer Schüler-lehrgange," by W. G Schuwerack, reports on experiments in the Rhineland within the framework of the new political scheme to show how a camp life can be organized not simply for bodily exercise but with an appeal to the intelligence of boys from Prima and Sekunda

These classes from the higher schools can attempt more than the usual camp life of the Hitler Jugend or Bund Deutscher Mädel The material for the course of instruction is taken from the surrounding landscape, geological, botanical and zoological characters, human settlements, food possibilities, exploitation of the soil, means of transit, trade relations with neighbours, racial origins, religious influences in customs, dialect, etc All this regional survey interests those who come from other parts of Germany, and also allows individuals to specialize in their choice of study according to inclination Some guaranteed leisure is necessary so that scholars may prowl round the area for themselves and without a teacher This scheme is for boys aged 16 to 20

H R

VOLUME VII. JUNE, 1937. PART 2.

A STUDY OF THE NORMS AND THE VALIDITY OF CERTAIN MENTAL TESTS AT A CHILD GUIDANCE CLINIC.

PART II.

BY P E VERNON
(Jordanhill Training Centre).

VI.—*Seguin-Goddard formboard*
VII —*Healy picture completion test II.*
VIII —*Porteus mazes.*
IX —*Passalong test.*
X —*Moorrees formboard.*
XI —*Burt's graded word reading test*
XII —*Conclusions*
XIII —*Summary.*

VI —SEGUIN-GODDARD FORMBOARD

BOTH the size of this board, the shape and arrangement of pieces, and the norms, are somewhat confused Two main types of board may be distinguished The first, and most frequently used, contains the rhombus, star, oval and square from left to right in the bottom row (in Sylvester's board[1] the pieces were the same, but the order in each row was reversed). The dimensions of this board are 18-in to 20-in. by 12-in to 14½-in. According to Sylvester small variations in size do not affect the norms. The second type, devised (but not used) by Pintner and Paterson[2], contains the circle, oval, square, and rhombus in the bottom row, and the relative sizes of several of the pieces are different This arrangement is used chiefly in the small light board of the Merrill-Palmer scale, whose dimensions are 16-in by 10-in., and in the Drever-Collins scale

The only norms for the latter board are Stutsman's, which range from 2·9 to 5·9 years[3] The following discussion refers solely to the former board. For this the original norms were issued by Sylvester (quoted by Pintner and Paterson), these were based on the fastest of three trials. Wallin (quoted by Bronner and Healy[1]) later issued norms based on the average of three trials According to Arthur's recent standardization[2], Sylvester's figures are fairly correct, but Wallin's are much too strict. Gaw used Sylvester's norms, but added a few figures from her own cases of 10 to 13 years, based on the average of three trials[3], we do not know, however, how adequate were her samples from 10–12 years. Probably the best available figures are those listed by Cattell[4], which are derived from Arthur's and Sylvester's He has added his own results for the youngest age groups, and some figures suggested by the present writer at the upper end of the scale The latter figures, however, were founded on clinic cases and are too lenient[5] Earle and Milner[6] tested 259 cases aged 13+ and found a median time for the fastest of three trials of 13 seconds. Martin-Leake and Smith[7] obtained a median of 12 1 seconds among 1,340 cases aged 14+, who were probably an average sample. Both these results fit in well with Cattell's table Cattell has also taken the sensible step of tabulating norms for the *total* of three trials, instead of for their *average*, as well as for the fastest of three

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[1] SYLVESTER, R. H *The Form Board.—Psychological Monographs,* Vol XV, No 65, 1913, pp. 56

[2] PINTNER, R, and PATERSON, D G *A Scale of Performance Tests* (New York Appleton, 1923, pp 218)

[3] STUTSMAN, R *Mental Measurement of Preschool Children.* (Yonkers, N Y . World Book Co, 1931, pp 368)

The test has been used very extensively at the Maudsley Hospital, and the cases whose results are listed below are probably typical of the total clinic population They are grouped both according to C A. and Binet M A.

The Q 's of times averaged 14 2 per cent in the C A groups and 13·0 per cent in the M.A groups, showing that the figures are fairly reliable In an unselected group of 311 of these cases a considerable sex difference, averaging 0·70 Goddard M A years, was found But as boys and girls are represented in roughly equal numbers, they have been combined in Table VIII

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[1] Bronner, A. F., Healy, W , Lowe, G M., and Shimberg, M E *A Manual of Individual Mental Tests and Testing*. (Boston Judge Baker Foundation, 1927, pp 287)

[2] Arthur, G . *A Point Scale of Performance Tests*, Vols I and II. (New York. Commonwealth Fund, 1933.)

[3] Gaw, F. *Performance Tests of Intelligence —Industrial Fatigue Research Board Report*, No 31. (London H M Stationery Office, 1925, pp. 45)

[4] Cattell, R B. · *A Guide to Mental Testing*. (University of London Press, 1936, pp 312.)

[5] According to Martin-Leake and Smith, the fastest time obtained by skilled adult workers approximates 5½ seconds

[6] Earle, F M , Milner, M , et al. *The Use of Performance Tests of Intelligence in Vocational Guidance —Industrial Fatigue Research Board Report*, No. 53 (London. H M Stationery Office, 1929, pp 69)

[7] Martin-Leake, M , and Smith, T *The Scientific Selection and Training of Workers in Industry and Commerce* (London Pitman, 1932, pp. 104)

TABLE VIII

C A Group.	*N*	*Median Times*		*Goddard M A (Cattell's norms)*	*Binet (corrected) M A Group*	*N*	*Median Times*		*Goddard M A.*
		Fastest of three	*Total of three*				*Fastest of three*	*Total of three*	
5+	23	35	123	5·0	4·0–5·11	46	37½	127	4·8
6+	35	28½	103	5·9	6+	50	25	97½	6·5
7+	72	24	86	7·1	7+	48	22½	85½	7·4
8+	55	21	79	7·8	8+	64	20	76	8·0
9+	50	20½	71½	8·1	9+	83	20	72⅓	8·2
10+	54	18	70	9·0	10+	70	18	67	9·2
11+	43	16½	60	10·1	11+	55	16	55½	10·7
12+	44	16½	60	10·1	12+	43	15	55⅓	11·0
13+	53	15½	55	10·9	13+	24	15	53	11·2
14+	37	15	55	11·0	14–15+	27	14½	52	11·5
15+	58	16	57	10·6	16–21	14	13½	49	12·3
	524					524			

It will be seen that all the C.A groups are much below the norms, and that the same is true of all the M A. groups except the three youngest. Probably, therefore, this is a test where emotional maladjustment has a definite adverse effect on speed But although the test takes so brief a time, and although it might appear to depend on some kind of manual dexterity rather than on intelligence, it gives good correlations with Binet Worthington[1] obtained a coefficient of +·76 among 346 clinic children. The present writer worked out the correlations in 343 unselected cases according to both methods of scoring, the coefficients, with C.A partialled out, were + 572 ± 025 and +·646 ± 021. Among 120 subjects aged 13 or over the coefficients were + 653 ± 035 and + 547 ± 043. These latter figures are, however, spuriously high since the group was exceptionally heterogeneous; the S D. of its I.Q.'s was 20 If this was reduced to the more usual S.D of 15 the average correlation, + 60, would drop to + 49 ± 047 This is still high enough to show that the test has some relation to intelligence, as measured by Binet, in adolescents and adults

There is little to choose between the two scoring methods, they inter-correlate + 965 ± 004 But it is probably best to use a combination of both methods, since this will somewhat increase the reliability of the Goddard M A.

VII —HEALY PICTURE COMPLETION TEST II

This test is of particular interest to practising psychologists since it appears to vary more than any other with emotional maladjustment. Before presenting the evidence we must consider what norms should be adopted. The American norms originally published by Healy[2] were very thorough, and they have been fairly closely confirmed by Arthur On *a priori* grounds we might expect British subjects to come out lower, owing to the characteristically American setting of the test material. Indeed Picture No. IX (Saluting the Flag) must inevitably be so much more unfamiliar in this country that it has usually been omitted by the writer.[3] (Since it contributes 9 marks to a total of 104, the Maudsley Hospital results, quoted below, have been multiplied by $\frac{104}{95}$ in order to make them comparable with other published figures) Other pictures offer similar, if less striking, difficulties. Actually, however, Gaw and Earle obtained rather higher scores at 13+ than the American norm, namely 62½ instead of 60 points

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[1] WORTHINGTON, M R · *A Study of Some Commonly Used Performance Tests.—Journal of Applied Psychology*, Vol X, 1926, pp 216–227

[2] HEALY, W . *Pictorial Completion Test II —Journal of Applied Psychology*, Vol. V, 1921, pp 225-239

[3] In some copies of the test, a Union Jack has been substituted for the Stars and Stripes, which no doubt makes this picture somewhat easier But British children are still much less habituated to saluting flags than are American.

Since the English results cover so small an age range, the writer has preferred to retain the American norms The following figures are based on a combination of those given by Healy and Arthur They have been arbitrarily extended from 16 to 21 years by identifying 21 with the maximum possible score and interpolating

TABLE IX

P.C II M A .	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Points .	15	28	38	47	52	55	58	61	63	66	70	75	80	89	104

Table X summarizes the results obtained at the Maudsley Hospital The Q.'s of scores in these groups average 19·1 per cent This is high, but no higher than the variability among Healy's subjects A slight sex difference was found in favour of male subjects, similar to that of Gaw and Earle, but it was not statistically significant.

TABLE X.

C A Group	*Mean C A*	*N*	*Mean Corrected Binet M.A*	*Mean P C II Score*	*P C II M A*
6 0–9 11	8 7	17	8 9	30 4	8 2
10–12+	11 7	57	11 2	43·0	9 5
13+	13 6	31	12 4	47 5	10 1
14–15+	14 7	53	13 4	53 1	11 4
16+	Adult	56	14·1	57 2	12 7
		214			

This table shows a very large discrepancy between Binet and Healy M.A 's, on the average the Healy I.Q.'s are 15 points lower than Binet I Q.'s. Had Gaw's norms been used the difference would have been still larger Confirmation for this finding may be derived from researches on criminals by Shakow and Millard[1], and by Mennens[2] The former tested

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[1] SHAKOW, D , and MILLARD, M. S *A Psychometric Study of* 150 *Adult Delinquents.—Journal of Social Psychology,* Vol VI, 1935, pp 437–457

[2] MENNENS, G *Etude Experimentale de Differentes Aptitudes Psychiques chez les Prisonniers —Journal de Psychologie,* Vol XXVIII, 1931, pp. 283–302

136 adults of mean Binet M.A 12 4 years, their average P.C.II score was 51, corresponding to a M.A. of 10 8 Mennens tested 81 French adults of mean Binet M A. approximately 12 years, their P C II score was only 38, i.e., 9 0 years M.A. Eccles's result with delinquent boys was similar[1], and Perry claims that feeble-minded subjects who did well on the test were superior in social adjustment [2]

The conclusion that this test offers a specific difficulty to abnormal personalities fits in well with the low correlations always found with the Binet test Least of all the common performance tests do we know what it measures. Several investigators have quoted coefficients of 4 to 5 with Binet or with *g* tests The present writer examined the agreement among 79 subjects aged 15 years or over. In spite of the unreliability of Binet at this level the correlation was +·539 ± 054, indicating that the test is by no means valueless in the diagnosis of adult ability.

VIII.—PORTEUS MAZES.

Porteus himself claims that this test indicates social adaptation in addition to intellectual ability,[3] and he is supported by Poull and Montgomery's study of problem children.[4] On the other hand Shakow and Millard, who tested 116 adult criminals, found a higher average Porteus M A than Binet M A,[5] and Mennens's group obtained similar scores on both tests [6] An investigation by Karpeles[7] suggests that thieving children may do as well on Mazes as on Binet, but that other types of maladjusted children—truants, sex and behaviour problems—may be relatively poor. In Jastak's investigation of performance tests which would differentiate problem children from normals[8], the Army Maze test, which resembles Porteus's test, was found to be one of the best for this purpose

But before we can accept a relatively low Porteus M.A as an indication of emotional maladaptation we must be certain that the method of application and the norms are properly standardized Unfortunately the test is defective in these respects. Few British psychologists use new blanks for each subject, with an additional blank whenever a mistake is made. In order to save expense, some (including the writer) use only one blank for each year, counting each error made by the subject as an extra trial, others arrange for the mazes to be traced without any marks being made on them Probably neither procedure is comparable with the original. The test situation is somewhat uncontrolled also since different testers may differ in the extent to which they allow tracing of the maze prior to drawing it, or in the extent to which they stop the subject from removing his pencil from the paper once he has started drawing, and so on These uncertainties do not mean that the test is not a valuable one for showing up both intellectual and temperamental differences But exact standardization is more difficult than with most tests. A further obstacle is that the new supply of Maze blanks differs in many respects from the old, so that figures based on old blanks will not necessarily apply to the present edition

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[1] ECCLES, A K · *The Performance of Delinquent Boys on Healy Completion Test II —Training School Bulletin*, No 28, 1931, pp 61–70

[2] PERRY, D *Interpretations of the Reactions of the Feeble-minded on the Healy Picture Construction Test II —Journal of Delinquency*, Vol VIII, 1922, pp 75–86

[3] PORTEUS, S D *Guide to the Porteus Maze Test* (Vineland, N J Training School Publications, No 25, 1924, pp 50)

[4] POULL, L E, and MONTGOMERY, R. P *The Porteus Maze Test as a Discriminatory Measure in Delinquency —Journal of Applied Psychology*, Vol XIII, 1929, pp 145–151.

[5] *Op. cit*

[6] *Op cit.*

[7] KARPELES, L. M. *A Further Investigation of the Porteus Maze Test as a Discriminative Measure in Delinquency.—Journal of Applied Psychology*, Vol XVI, 1932, pp 427–437

[8] JASTAK, J *Variability of Psychometric Performances in Mental Diagnosis.* (New York J Jastak, 1934, pp 99)

Neither Burt,[1] Gaw, Earle, nor Cattell describe the proper method of scoring Mazes XII and XIV, though it may be found in the books by Porteus, Bronner and Healy, and Arthur, listed above. According to this method, Maze XII counts ½ or 1 year when XIV is failed, and XIV counts, ½, 1, 1½, or 2 years if XII is failed. But if both are passed the scoring is as shown in the following table:

TABLE XI.

Score in years ..	5	4	3	2½	2	1½	1
Combined trials	2	3	4	5	6	7	8
Combined errors	0	1	2	3	4	5	6

The maximum score is therefore 16 instead of 14 years (without including the so-called Adult Mazes). This modification is of obvious value, since it confers on the test a greater M A range

Burt's and Arthur's results show that Porteus's norms are not very accurate even up to Maze XI, Burt usually finding them too lenient, Arthur too strict As these writers do not agree, and as their differences may be due to different methods of testing, the present writer has retained the simple Porteus method of scoring The following results were obtained at the Maudsley Hospital, using one fresh blank per year, counting one error as a second trial, two as failure, and adopting the modified scoring just mentioned for Mazes XII and XIV. The average value of Q was 1 55 years. Comparing 126 male with 57 female subjects, no significant sex difference was found

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[1] BURT, C L *Mental and Scholastic Tests* (London . King, 1921, pp. 432)

TABLE XII

C.A Group	*N*	*Mean Corrected Binet M A*	*Mean P M Score*
7–11+ (Median 10 7)	17	10 02	10 81
12+	17	11 89	11 68
13+	21	13·11	12 74
14+	29	13 81	12 88
15–17+	54	13·60	12·94
18+	45	14·60	13 20
	183		

The Mazes seem to be somewhat too easy for the youngest group, as Burt discovered. At 13 years there is fair agreement with the results of Gaw and Earle, who obtained medians of 12 5 and 12 3 years respectively among 100 and 570 13-year-old children, (but they scored only up to 14, not to 16 years) Testees of normal Binet M A. aged 14 or more obtain an average Maze score of little more than 13 years, which is what Arthur also found It appears then that clinic cases are not specifically inferior on the Maze test, as was suggested above But this conclusion is by no means certain since the writer's method of applying the test may have made it too easy To decide this point we must wait until groups of clinic and normal subjects tested by identical methods can be compared

It is not possible to extend the norms upwards, as was done with Binet and P.C II, since the maximum Maze score of 16 is attained by much too large a proportion of subjects The tester should remember, however, that the average adult score is likely to be about 13, so that 16 represents rather high ability. A quite different method of scoring in the adult range is to take account of speed Some stupid subjects can obtain a score of 16 if they are sufficiently cautious and take a long enough time. They should then perhaps only be credited with superior ability if they complete the series reasonably quickly.

The writer has recorded the aggregate time occupied by Mazes XI, XII and XIV among all his subjects who seemed likely to complete them (with or without errors), using a silent stop watch and never informing the subjects that speed was being noted. Table XIII shows the average total times for 147 subjects of various Binet M.A.'s, and indicates that speed as well as Maze score is related to intelligence. The relationship breaks down in the lowest M.A. group since these subjects were more highly selected than the rest.

TABLE XIII.

Binet Corrected M.A. Group	*N*	*Mean Maze Score*	*Mean Time for Mazes XI–XIV*
10–11+	26	12·99	255
12+	31	12·75	271
13+	25	12·82	238
14+	22	13·85	208
15+	13	13·92	196
16–17+	23	14·01	171
18+	7	14·50	161
	147		

The Q.'s of times for these groups average 22·4 per cent. This figure is rather high, that for the Maze scores being only 1·32 or 11 per cent. Thus the speed is unreliable, and gives a slightly lower correlation with Binet than does the Maze score. In a group of 107 subjects aged 14 or over the respective coefficients (calculated in terms of I.Q.'s) were +·381 ±·056 and +·474±·047. The latter figure is similar to the correlations obtained by Gaw, Earle and Alexander[1]. Since the speed and Maze scores are almost independent, correlating only +·044, M.A.'s determined by combining them will be decidedly more accurate than M.A.'s based on either alone. The correlation with Binet works out now at +·592±·041.

In constructing tentative speed norms an ogive distribution was plotted of the times taken by subjects of 14 years or over, and sections were cut off appropriate to various M.A.'s. These norms are given in Table XIV. They may require to be made more strict, if tried out on normal subjects. It is not recommended that scoring for speed be applied to subjects much below 14 years, for those children who complete the last three mazes will necessarily be a selected group.

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[1] ALEXANDER, W. P. *Intelligence Concrete and Abstract.—British Journal of Psychology, Monograph Supplements,* No. XIX, 1935, pp. 177.

TABLE XIV.

Maze Speed M.A.	9	10	11	12	13	14	15	16	17	18	19	20	21
Time in secs	500	428	357	298	247	200	170	143	119	102	86	72	60

An advantage of scoring for speed is that it enables the tester to express quantitatively a temperamental factor that is manifested in the Maze test. If the speed M.A. is above average and the ordinary Maze M.A. lower than 13, it may be deduced that the subject is impulsive; and if the speed is relatively low he may be of a cautious temperament. Patients with obsessional neurotic tendencies may sometimes be diagnosed in this way.

IX.—PASSALONG TEST.

This test is of interest in that it has been well standardized on normal subjects in this country. In applying it, Alexander's shorter method of scoring was adopted; female subjects were credited with two extra points so as to bring them up to the male level. Since the norms do not go above 18½ years an arbitrary extension was made in such a way that the maximum score of 45 corresponds to a M.A. of 20½ years, 19½ years are assigned to scores of 42.

TABLE XV.

C.A. Group	*N*	*Mean Passalong M.A.*	*Mean Binet M.A.*	
			Uncorrected	*Corrected*
7–10+	24	10·57	9·97	10·10
11–13+	43	12·32	11·50	11·62
14+	34	13·06	12·67	13·03
	101			

Table XV summarizes the main results obtained by the writer. The average Q of scores in these groups is 14·9 per cent. It will be seen that the correspondence between Passalong and Binet M.A. is closer when the corrections, described in Section II, are applied to the Binet results.

Even with these corrections the younger subjects did rather better on Passalong than on Binet But they were probably selected to some extent at the time of testing as being likely to do Passalong well, no such selecttion took place wittingly among the 14+ and adult subjects Although there is no indication that this test offers special difficulties to emotionally maladjusted persons, yet the writer has noted, in applying it to a few psychotic adults, that the score appears to decrease rapidly with so-called mental deterioration

Passalong and Binet I Q 's gave an inter-correlation of +·467 ± ·059. This figure is much lower than the correlations obtained with intelligence tests in Alexander's first account of the test[1], but similar to several coefficients quoted in his later monograph. Since the test also takes a long time to give, it is not very suitable as a supplement to Binet in everyday clinic practice Probably its main value lies in its contribution to Alexander's performance test scale

X —MOORREES FORMBOARD.

Cattell[2] refers to this test under the above title, and also describes it briefly under the name—Leake-Smith Figure Board A fuller account is given by Martin-Leake and Smith[3] These appear to be the only references to it in the literature. Though the test is little known among psychologists, it has been used successfully in vocational guidance at Rowntree's Cocoa Works for 14 years, and it possesses considerable value in testing the upper ranges of intelligence Unfortunately no standard board is manufactured as yet The existent ones have been made privately and vary somewhat in colour, in the tightness with which the pieces fit, and in other respects that may affect the norms It consists of twelve problems or items of varying difficulty, each of which requires the arrangement of three or four coloured pieces in a recess of the same colour The pieces are placed in standard positions on the lid *before* the subject sees the test. The dimensions, colours, etc., and the exact instructions to the subjects may be found in Martin-Leake and Smith's book

At Rowntree's Psychological Department the scoring is based simply on the number of items completed in three minutes Much finer discrimination is possible if the time taken for all twelve items is recorded, but an adjustment is necessary when subjects are unable to complete some of them Subjects of superior intelligence can generally solve all the items, those of normal intelligence may fail at one or two, those of M.A 10 or less may fail at any of the last seven items. The present writer's practice has been to encourage subjects who wish to give up a difficult item until they have spent two minutes on it Occasionally they may be allowed to proceed to the next item earlier if there is no apparent chance of success; and if they are on the point of success the two minutes may be exceeded But each failure is arbitrarily counted as two minutes

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[1] ALEXANDER, W P *A New Performance Test of Intelligence —British Journal of Psychology*, Vol XXIII, 1932, pp. 52–63.

[2] *Op cit*

[3] *Op. cit*

Tentative time norms, obtained by this method of recording, are given in Table XVII It will be seen that the test takes unduly long with persons of subnormal intelligence. It has its greatest value in the supernormal group—a group for whom good individual tests are much needed. At this level it does not occupy much time, and has a very high discriminative power.

The total time method of scoring is still somewhat crude, since the three or four most difficult items exert on it such a disproportionate weight (Nos. VI, IX, and XII usually take four times as long as Nos I, III, and IV) Again, a subject may do eleven of the items very quickly, and then reduce his final score as much as two M.A years by becoming confused and failing at No. XII. A fairer method would be to score each item with equal weight, or better still with a weight corresponding to its diagnostic validity

The times for each item were therefore recorded among the writer's first 90 subjects, and the relative validity of the items was found by correlating these times both with the total time on the test and with Binet M.A.'s. For each item an ogive distribution of time was then plotted, and points were assigned to various steps of time The range of points was 1 to 9 for the items with poorest, and 0 to 10 or 11 for the items with highest, validity; in this way the latter were weighted more highly than the former. In giving the test, the time should be noted as each item is completed At the end, the time for each item is calculated and the number of points to which it corresponds is read off from Table XVI. The points for items I–V+X are summed, and also the points for items VI–IX+XI–XII. Both these point score totals averaged about 25 in a group of normal ability and had a S.D of approximately 10 It was originally intended to use them as T-scores, simply by adding 25 to each But the T-score system has since been discarded, and they have been transposed instead into M A 's The method of transposition was as follows ·

Owing to the kindness of Miss Stevenson, of Rowntree's Psychological Department, results were available for some six thousand persons tested by the " Items in 3 minutes" method. These testees ranged from council

TABLE XVI.

The conversion of seconds spent on each item of the Moorrees Formboard into Point Scores.

*Any success in over two minutes counts
1½ points in Item IX.
1 " " " XI
2 " " " XII

	Items I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	*IX*	*X*	*XI*	*XII.*
1	119–17	119–28	119–21	119–26	119–26	119–100	119–82	119–80	*	119–51	*	*
2	16–13	27–24	20–17	25–18	25–21	99–62	81–61	79–51		50–33	119–68	
3	12–11	23–21	16–15	17–16	20–18	61–50	60–46	50–36	119–68	32–26	67–50	
4	10	20–17	14	15–14	17–15	49–42	45–36	35–28	67–47	25–22	49–40	119–70
5	9	16–15	13–12	13	14–13	41–37	35–29	27–22	46–33	21–18	39–33	69–55
6	8	14–13	11	12	12	36–32	28–24	21–20	32–25	17–16	32–28	54–45
7	7	12	10	11	11	31–26	23–20	19–17	24–21	15–14	27–23	44–38
8	6	11–10	9–8	10–9	10–9	25–21	19–15	16–13	20–17	13–9	22–18	37–32
9	5–0	9–0	7–5	8–7	8–0	20–10	14–9	12–10	16–13	8–0	17–12	31–23
10			4–0	6–0		9–0	8–0	9–0	12–0		11–0	22–13
11 *points.*												12–0

school girl applicants to major executives, i.e, groups whose M A level can be estimated fairly accurately from tables of occupational norms. Hence a scale for transposing items in three minutes into approximate M.A 's could be drawn up, 12, 11, 10 . . . 6, 5 items correspond roughly to 19, 18, 17, . . . 13, 12 years of M.A. From the writer's results with 161 subjects the average point scores corresponding to numbers of items completed in three minutes were determined. By this means it was found that the average point scores for males of 14 or over are 27 and 27½, for females 24 and 23½. Point scores for certain other mental ages were similarly estimated, and by extra- and inter-polation the tentative norms given in Table XVII were found. A similar procedure was applied to the total time norms. These norms are for male subjects, in the case of females it is recommended that a year be added to their scores.

It has not yet been explained why two point scores are adopted, instead of one or twelve or some other intermediate number. The reason is that items I–V+X (in the writer's board[1]) are all easy; they seem to depend largely on some kind of manual dexterity. Whereas the other six items, though they can usually be solved eventually by trial and error methods, are essentially reasoning problems, and are far more productive of failures. The average inter-correlation of the six items in each set was calculated, and the reliabilities of the two sets were thus found to be +·789±·026 and +·705±·036; whereas the correlation between the two sets was +·640±·042, showing that the two sets are relatively discrete. Furthermore they give different correlations with Binet M.A, namely +·400± 045 and +·557±·037, so confirming the supposition that the second set involves higher mental processes than the first. On the other hand the first set is more closely akin to a formboard such as Seguin-Goddard, the inter-correlations for 43 subjects who had taken both tests being + 60± 066 and +·39±·087. It would be very desirable for a fuller factorial analysis to be made of the two scores by an accurate factorial method, so as to find their *g*, *F* and manual dexterity factor saturation. But it would seem justifiable provisionally to regard the Moorrees Formboard as two tests rather than one, the first mainly involving speed, the second more dependent on mental " power " Thus in the table of norms the two point scores are loosely referred to as speed and power scores.

Finally, this test gives very useful indications of qualitative aspects of the subject's mentality and of his temperamental characteristics. In this respect it is probably almost as revealing as the recently published Oakley Formboard[1], and has the advantage over the Oakley Board that its quantitative scores are likely to be much more reliable. Some subjects, for example, seem to resemble a Thorndike cat in their method of approach, others are more like a Köhler ape Owing to its difficulty it gives excellent opportunities for making subjective observations of systematic-ness or impulsiveness, persistence, self-control, emotionality, etc Defects of vision and colour blindness are also sometimes revealed by it

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[1] It is possible that on some boards Item X is considerably more difficult than on the writer's, where the pieces fitted rather loosely Should this prove to be true on boards made to a standard pattern, then it may become necessary to class Item X with the " reasoning " rather than with the " manual dexterity " items.

TABLE XVII.

Moorrees M A.	*Point Scores*		*Total Time Mins Secs*
	" Speed "	*" Power."*	
10	10	8	12 30
11	14	13	10 30
12	19	18	9 10
13	23	23	7 55
14	27	28	6.50
15	31	32	5 45
16	35	37	4 45
17	40	43	3 50
18	44	47	3 03
19	48	52	2 25
20	52	55	2 03
21	56	58	1 45

XI —BURT'S GRADED WORD READING TEST

Some account of this test is included here, since it was applied at the Maudsley Hospital as a routine test, not merely to cases of suspected reading disability It occupies very little time and yields a rough preliminary placement of many children's M A. level. Table XVIII summarizes the chief results obtained for approximately equal numbers of males and females The sex difference in favour of the latter averaged 0 55 years, which is similar to the difference of about 0 3 years given in Burt's tables. The average value of Q was 1·58 years.

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[1] OAKLEY, C. A.: *A New Formboard.—The Human Factor,* Vol IX, 1935, pp. 105–108.

The discrepancy between reading age and M.A is hardly as great as had been expected, considering that a clinic always attracts many cases of educational backwardness It is biggest in the younger age groups, but has almost disappeared by 15 years At 15 or over the discrepancy may well be due, not to reading disability, but to the limited maximum of the test, which only measures up to 15·0 years.

TABLE XVIII.

C.A Group	*N.*	*Mean Corrected Binet M.A.*	*Mean Burt Reading Age*
5-6+	10	6·60	5·44
7-8+	38	8·04	7·17
9-10+	43	9·72	8·53
11-12+	42	11·30	10·51
13-14+	43	12·33	11·31
15-16+	34	12·89	12·50
17+	41	13·91	13·38
	251		

So many of the older subjects could read almost all the words (except "phthisis"), that an attempt was made to extend the list, in order to yield a rough index of superior capacity. But the additional words and the tentative norms will not be given here, since the writer is at present engaged on a thorough re-standardization of the test, and the preparation of an alternative, extended, word list. These will be published shortly

Correlations between Binet and Reading I.Q.'s were calculated for 5 to 10+, 11 to 14+ and 15 to adult groups, yielding +·712±·035, +·809 ±·025 and +·641±·046. We would expect the agreement to be highest in the middle group, since it contains few cases of educational backwardness. It is noteworthy that these coefficients are generally higher than those obtained between Binet and performance tests.

XII —CONCLUSIONS.

The previous sections have dealt mainly with details concerning the application, scoring and validity of certain tests, but a few more general conclusions may be drawn First let us compare the clinic population *with a normal population. It appears to be below average on almost all* tests of ability The average Binet I.Q. of 1,000 cases, when corrected by the method described in Section II, is 95·0, the S.D. 16·6. The distribution is given in outline in Table XIX, and alongside it the proportions of a normal population (with σ I.Q.=16·6) which would be expected at each level of intelligence. An interesting result is indicated by a comparison of these distributions, though the numbers are insufficient for it to be statistically reliable,[1] namely that those of very superior intelligence are somewhat *more* liable to personality maladjustments than are the moderately superior Though very bright children are, of course, less likely to be referred than average or dull children, yet the number with outstanding intelligence at all age levels is considerable. One girl tested as high as I.Q. 160 Proportionate to their numbers in the total population children of I.Q about 115 contribute the smallest, children of I.Q. about 85 contribute the largest, number.

TABLE XIX.

Intellectual Level.	*I Q*	*Distribution in Clinic Cases*	*Distribution in Normal Population*
Very Superior	130+	28	36
Superior	130–110	158	239
Average	110–90	405	450
Dull	90–70	349	239
Very Dull, . .. , ..., ..	70–	60	36
		1000	1000

In spite of this observation there is a general tendency towards positive correlation between superior ability and emotional stability. This, of course, has also been shown by Terman's *Genetic Studies of Genius*, Burt's *Young Delinquent*, and by work such as Earl's on the emotional subnormality of mental defectives.[2]

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[1] If, however, the clinic distribution is compared with a normal distribution centred round 95 I.Q., the two are found to be significantly different, since chi squared is 31, when there are 14 degrees of freedom The big positive discrepancies occur at I.Q.'s 85, 130, and 135+; the big negative discrepancies at I.Q.'s 105, 110, and 115.

[2] EARL, C. J. C. *The Affective-Instinctive Psychology of Imbecile Children.—British Journal of Medical Psychology*, Vol. XV, 1936, pp. 266–278.

More important, perhaps, than this general backwardness is the differential effect of personality maladjustment on particular tests. Unfortunately, the present study is far too incomplete to afford much information on this point, both because it omits many tests that are in common use at clinics, and because the tests with which it deals could only be analysed superficially Much more evidence is needed on these tests, on the component items of the Binet scale, and on other performance and educational tests. (Is it true, for example, as is often claimed, that emotionally unstable children find especial difficulty with arithmetic?) Our results may be supplemented to some extent by those of Jastak.[1] He concludes that the scatter of passes on the Binet scale, though widely believed by clinic psychologists to be diagnostic of maladjustment, has no such significance. By applying a number of tests to groups of normal and abnormal children, who were of the same intelligence on a Vocabulary test, he found the greatest differentiation between them in Cube Construction, Army Beta Mazes, and three of the Binet items—Reading and Recall, Digits Backwards and Memory for Designs. On the basis of Simmins' results with psychotic adults,[2] we might expect to find that Penrose and Raven's new perceptual tests[3] (which are suitable for application to children) will also be adversely affected by maladjustment.

The psychological explanation of such results must necessarily be highly tentative It can hardly be maintained that tests which are done poorly by clinic subjects are predominantly "eductive," and that tests which they do well, such as Vocabulary, are predominantly "reproductive", for Digits Backward and Jastak's other Binet items will not fit into this classification. Therefore the decreases in scores among the maladjusted cannot be primarily due to any deterioration of g Nor is it likely that the discrepancies can be adequately expressed in terms of those factors which are already fairly well established such as g, v, F and w, though further investigations in factorial analysis may throw a good deal of light on the problem Rather it would seem that the mental processes needed for the solution of our tests are far more diverse and qualitatively dissimilar than has generally been supposed hitherto, many of them are affective in character, not purely cognitive. With normal subjects we can afford to neglect these dissimilarities, by ascribing them to specific factors which tend to cancel one another out. But in testing abnormal children or adults the dissimilarities are more apparent than the similarities, and the affective components assume considerable importance. The tests that offer especial difficulties to the maladjusted seem (to quote Jastak) . . . " to require a greater degree of certain readiness, willingness, a prepotent ' Einstellung ' of an emotional nature which will permit the existing intellectual potentialities to manifest themselves in an orderly, uniform, and integrated fashion "

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[1] *Op. cit*

[2] SIMMINS, C *Deterioration of "G" in Psychotic Patients*—*Journal of Mental Science*, Vol LXXIX, 1933, pp 704–734

[3] PENROSE, L S, and RAVEN, J. C *A New Series of Perceptual Tests.*—*British Journal of Medical Psychology*, Vol. XVI, 1936, pp 97–104.

Such an explanation does not, of course, take us very far And until we achieve a much more thorough psychological and psychometric analysis of the mental processes on which our tests depend, clinic psychologists should exercise great caution in interpreting their results. They should keep in mind also how uncertain are most of the test norms, and realize that norms vary not only with age, but often with sex and with the emotional state of the testees.

One further object of the above enquiry has been to collect together a battery of individual tests which can be applied among persons over 14 years, such as delinquent adolescents, vocational guidance cases and mental hospital patients When they are likely to be subnormal in ability, Binet and some of the stock performance tests can be used. But when normal or supernormal ability is likely, the following tests have been found by the writer to be especially useful.

(1) Burt-Stanford-Binet, corrected as described above, alternatively the Vocabulary test alone, no corrections being employed.
(2) Burt's Graded Word Reading test, in the extended form.
(3) Moorrees Formboard, scored for " speed " and " power "
(4) Porteus Mazes, scored in the usual way, and for speed.
(5) Healy Picture Completion II and/or Passalong.

As shown above, these can all be scored in terms of arbitrary M.A units ranging from 14 (normal) to 21 (maximum) years. Other tests have usually been included, such as Simmins and Stephenson's perceptual *g* tests, or a short set of verbal *g* tests, akin to those contained in group tests but answered by word of mouth. The data so-far obtained on these is insufficient for any account of them to be given here.

XIII.—SUMMARY.

The practising psychologist employs as psychometric and diagnostic tools a number of tests, without knowing precisely what they measure, nor how accurate they are Owing to the difficulties of carrying out a thorough examination of these tests on normal subjects, the present study attempts to supplement our knowledge by considering the results obtained with them at a child guidance clinic and at a mental hospital for voluntary adult patients (pp 72, 73).

The Burt-Stanford-Binet test is probably the best version of the Binet scale for British children, but it is very inadequately standardized at the upper age levels. Above 14 years intelligence quotients are decidedly too low, even when 14 is used as a denominator. This is indicated by the decrease with age of the average I.Q. level of 1,000 clinic cases. The Vocabulary test, on the other hand, appears to be fairly well standardized throughout ; hence Vocabulary M.A.'s draw progressively ahead of Binet M.A.'s. Several lines of evidence suggest that the average adult score on Stanford or Burt-Stanford is about 13½ years A rough method of correcting Binet M.A.'s is presented , M.A 's between 12 and the maximum of 18 years are thereby spaced out from 12 to 21 years so that (with a denominator of 14) the maximum adult I Q. is 150.

To avoid these difficulties many psychologists prefer to use well standardized group tests among adolescents and adults , but these are unsatisfactory instruments for individual diagnosis. Binet and performance tests afford a qualitative understanding of the individual personality, over and above quantitative measurement, which, in spite of its subjectivity, is essential in clinic practice (pp 73–82)

There has been very little accurate standardization of performance tests in this country, except at the age 13+, and the American norms may often be inappropriate. The establishment of British norms on the basis of cases tested at a clinic is scarcely possible, not because such cases are generally subnormal—since that could be allowed for by selecting cases of normal Binet M A —but because problem children and mental patients are specifically retarded on certain tests (pp. 83–85).

Mare and Foal Test.—The American speed norms seem to hold well for younger age groups , above 8 years the test is unsatisfactory. A considerable sex difference, and a good correlation with the Binet test, are noted (pp. 85, 86).

Ship Test.—Up to 9 or 10 years the test is best scored by Arthur's point method Her norms are confirmed, but from 10–12 years the scoring is awkward and the discriminative power of the test very poor. A supplementary method of scoring by speed is therefore suggested, and tentative norms are supplied. Combining both methods yields a good correlation with Binet (pp. 86–88).

Seguin-Goddard Formboard.—The various sizes, arrangements of pieces, methods of scoring and sets of norms for this test are outlined. Clinic cases of 8 years and over obtain results which are markedly inferior to their Binet mental level, thus it is presumably affected by emotional maladjustment. In spite of its brevity and simplicity the test gives fair correlations with Binet even among subjects aged 13 or over. The existence of a sex difference is confirmed (pp 115–118)

Healy Picture Completion Test II —This gives the largest discrepancy of all between performance and Binet M.A.'s The discrepancy cannot be accounted for by its typically American content, for the available British norms are if anything stricter than the American. Hence the test probably depends to a considerable extent on social and emotional factors. Its correlation with Binet is rather small, though still significant enough to justify its use among adolescents and adults. A suggested extension of the norms to 21 years M.A. is given (pp. 118–120)

Porteus Mazes.—In contrast to the results of some other investigators (including the author of the test), no specific inferiority is discovered among clinic cases. But the details of procedure vary among different psychologists, and the procedure employed in this study may have made the test too easy The proper method of scoring (up to a maximum of 16 years) does not seem to have been generally adopted in this country But even with this method the average adult score is only about 13 years Supplementary speed norms, extending up to 21 years M A , are proposed, they are based on the time taken spontaneously over the last three mazes. Speed and score combined yield a moderate correlation with Binet among older subjects, and a discrepancy between the two serves as an index of impulsiveness or caution (pp. 120–124).

Passalong —The test has been standardized in this country, and yields M A 's which are higher than ordinary (uncorrected) Binet M.A 's Its correlation with Binet is comparatively low (pp 124, 125).

Moorrees Formboard.—This is a complex formboard, developed at Rowntree's for vocational selection. It possesses great discriminative power in the superior adult range, and is very useful for testing persons of M.A 14 or over. Scoring methods are given, based either on the total time or on the time for each of the component parts of the board. These parts fall into two main sets, one set depending largely on manual dexterity (and correlating more highly with the Goddard Formboard than with Binet), the other set involving more reasoning power (correlating better with Binet) Norms are ultimately derived from large groups tested at Rowntree's, but they are somewhat uncertain since the construction of the board is not yet standardized. A large sex difference is found. The test is especially useful for showing temperamental differences in attacking difficult concrete problems (pp. 125–129).

Burt's Graded Word Reading Test.—Clinic children, who include many cases of reading disability, are on the average a year retarded behind their Binet level at this test The discrepancy tends to disappear by 14, but since the maximum test score is 15 years, superior reading capacity among adolescents and adults cannot be gauged. A revision of the test and an extension are being prepared. The test gives higher correlations with Binet than do any performance tests. A sex difference in favour of females is confirmed (pp 129, 130).

The clinic group as a whole is somewhat below the norms on almost all tests of ability, and this confirms the existence of a moderate correlation between intelligence and emotional stability But it is possible that children and adults of very superior intelligence are rather more liable to personality maladjustment than would be expected. The differential effect of maladjustment on particular tests is difficult to explain in view of the paucity of experimental data. It does not seem to be covered adequately by current psychological theories of intelligence testing, since these tend to ignore the considerable part played by affective mental processes in the test performances of abnormal children and adults

Suggestions are appended for a battery of individual tests which can usefully be applied to adolescents of 14 or over, and to adults, and scored in terms of M.A. units (pp. 130–133)

RÉSUMÉ

UNE ETUDE DES NORMES ET DE LA VALIDITÉ DE CERTAINS TESTS D'INTELLIGENCE EMPLOYÉS DANS UNE CLINIQUE D'ORIENTATION PSYCHOLOGIQUE DES ENFANTS.

Cette étude s'occupe de l'application des tests mentaux suivants à des groupes nombreux d'enfants et d'adultes mal ajustés dans une clinique d'orientation d'enfants et dans un Hôpital Mental volontaire : ceux de Stanford-Binet (revus par Burt), la Jument et le Poulain, le Test du Bateau, le "Formboard" de Seguin-Goddard, les Tableaux à compléter de Healy, No 2, les Labyrinthes de Porteus, Passalong, le " Formboard " de Moorrees, et le Test gradué de mots à lire de Burt L'échelle Binet est mal standardisée au-dessus de 14 ans ; mais l'on suggère une méthode pour modifier ses âges intellectuels chez les adultes, puisque dans la pratique clinique c'est un test d'intelligence beaucoup plus utile que ne le sont les tests collectifs

Les normes britanniques pour les tests d'accomplissement sont souvent défectueuses, et bien des détails du procédé ont besoin d'être éclaircis L'étude s'efforce de rémédier à quelques-uns de ces défauts On decouvre que les personnes mal ajustées tendent à se montrer au-dessous du normal dans tous les tests, et que leur état émotif a une influence mauvaise sur leur accomplissement qui est plus forte dans quelques-uns des tests que dans d'autres.

ZUSAMMENFASSUNG.

EINE UNTERSUCHUNG DER NORMEN UND DER ZUVERLÄSSIGKEIT GEWISSER GEISTIGER TESTS IN EINER KLINIK FÜR KINDERBERATUNG

Dieser Artikel behandelt die Anwendung folgender geistiger Tests auf grosse Gruppen schlecht angepasster Kinder und Erwachsener an einer Klinik für Kinderberatung und an einem freiwilligen Krankenhaus für Geistige Hygiene: Stanford-Binet (Burts-Verbesserung), Stute und Füllen, Schiffstest, Seguin-Goddard-Formenbrett, Healys Bildvervollständigungstest 2, Porteus' Irrgänge, Passalong Moorrees Formenbrett, und Burts nach Alter Geordneter Wortlesetest Uber 14 Jahre ist die Binet-Skala schlecht normiert, aber eine Methode, ihr geistiges Alter für Erwachsene zu ergänzen, wird vorgeschlagen, da sie ein viel wertvollerer Intelligenztest in der Praxis ist als die Gruppentests

Britische Normen für Leistungstests sind oft fehlerhaft, und viele Einzelheiten des Verfahrens bedürfen der Aufhellung Der Artikel versucht einige dieser Unzulänglichkeiten zu beheben Es hat sich herausgestellt, dass schlecht angepasste Menschen gewöhnlich bei allen Tests unternormal sind, und dass ihr Gefühlszustand bei einigen Tests mehr als bei anderen eine nachteilige Wirkung auf ihre Leistung ausübt

A CRITICAL SURVEY OF OBJECTIVE ESTIMATES IN THE TEACHING OF ENGLISH.

By DOROTHY BAGLEY.

Part II.

- V.—*The Mechanics of written composition.*
  - 1.—*Spelling*.
    - (*a*) *Nature of investigations.*
    - (*b*) *Psychology and teaching method.*
    - (*c*) *Disability.*
  - 2.—*Formal grammar.*
  - 3.—*Applied grammar.*
- VI.—*Written composition.*
- VII.—*The rating of compositions.*
- VIII.—*Some general conclusions*

V.—The mechanics of written composition

1.—*Spelling.*

(*a*) *Nature of investigations.*

Objective study of the teaching of spelling was initiated by the investigations of J. M. Rice, in 1897, into the results produced by the constant and lengthy application to the subject common to American schools of the time. He declared as one of his findings that not more than fifteen minutes a day could profitably be allocated to spelling[1] Several studies of more recent date have questioned the efficacy of spelling instruction, the conclusion of one extensive and carefully organized American experiment, in 1930, being that " if mastery is the standard, spelling instruction is only 50 per cent efficient in all except the upper grades, where it is a little more than one-third."[2] The ability to spell words orally or to write them correctly when dictated is, moreover, often not transferred to free composition.[3]

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[1] Rice, J. M.: *The Futility of the Spelling Grind*.—*Forum*, No 23, 1897. Summarized by R S Thompson.—*Teachers' College Contributions to Education*, No. 436. (Columbia University, 1930)

[2] Thompson, R. S: *The Effectiveness of Modern Spelling Instruction*.—*Teachers' College Contributions to Education*, No 436. (Columbia University, 1930)

[3] Fitzgerald, J A *Words Misspelled by Children of the 4th, 5th and 6th Grade Levels in Life Outside School*.—*Journal of Educational Research*, Vol. 26, p. 213.

As in the case of reading, investigations have been going on for a number of years and a great deal of preliminary work was done before any co-ordination was attempted The main objectives in the attack on the problem were outlined, in 1919, as follows

(1) To discover precisely the words we most frequently need to spell

(2) To grade these words scientifically

(3) To discover the most economical methods of learning them

(4) To devise means by which progress in learning the words may be measured [1]

The greatest success has been achieved in connection with the last of these objectives and good work done with the first and second The most economical methods of learning cannot be dogmatically stated, although valuable suggestions have been made The Word Lists, made by Thorndike and others, have provided the material for graded spelling lists and the necessary information regarding word-frequency. Much has been learned about word difficulty from the numerous classifications of errors made by children and adults, and the frequency of occurrence of different types of errors has been noted,[2] the initial error being about 2·5 times as likely to be repeated identically as a correctly spelled word is likely to be later misspelt.[3] There are numerous American spelling lists for learning and testing purposes One of the most useful of these contains sixteen tests, each of twenty sentences, one word only is to be written, the context supplying the meaning [4] The most recent in England is The Essential Spelling List drawn up by F. J. Schonell in 1932. in the arrangement of practice and test material the writer has taken into consideration those findings of experimental studies which are, in his opinion, most important and most fully proven.

[1] HORN, E *Principles of Method in Teaching Spelling derived from Scientific Investigations*—18th *Yearbook of the National Society for the Study of Education*, Part 2, 1919

[2] RUSK, R R *Analysis of the Spelling Errors of Adults*—*Journal of Experimental Pedagogy*, Vol 2, p, 119
STEAD, H E *Spelling Errors in Children*—*Journal of Experimental Pedagogy*, Vol 2, p 382
SARTORIUS, J C *Generalisation in Spelling*—*Teachers' College Contributions to Education*, No 472 (Columbia University, 1931)
MENDENHALL, J E *The Characteristics of Spelling Errors*—*Journal of Educational Psychology*, Vol 21, p 648

[3] ASHBAUGH, E. J *Non-School English of High School Students*—*Journal of Educational Research*, Vol 12, p. 307

[4] HUDELSON AND OTHERS. *Sixteen Spelling Scales Standardised for Secondary Schools*, 1920.

(*b*) *Psychology and teaching method*

Although our knowledge is still incomplete, certain facts concerning the psychology of learning to spell have emerged from experimental studies, upon which successful teaching method may be founded.

(1) Correct spelling is an acquired habit; the growth of the ability is similar to that of the perceptual process in reading, largely unconscious and dependent upon habit formation—the result of routine training—and partly upon intelligent comprehension.[1] Investigators disagree as to the extent of the influence of intelligence. It is, therefore, best to give specific instruction in this subject and to set apart periods for the study and practice of words, especially in the case of young children. This will be found a more profitable arrangement than leaving the acquisition of spelling to self-directed study on the part of the pupil or haphazard learning in other lessons[2] Class instruction and repetitive word drill are valuable with juniors, say to the age of 10+ and occasionally with older pupils For the latter, spelling is largely an individual matter, to be adjusted according to need[3]

(2) When the spelling of a word is learnt, the process is apparently as follows —The word is first perceived as a whole. It is then split into syllables and the perception of those linked with correct sound by pronunciation[4] (Faulty pronunciation is one of the major causes of spelling error[5]) In this way the necessary auditory and articulatory associations are formed The parts are then related to the whole by additional eye-movements covering the whole word. The writing of the word should accompany the learning so that the necessary associated movements also become habitual. In spelling lessons, therefore, words should be, in general, seen, heard, pronounced, and written.[6] Training in Phonics appears to be a handicap. Visual memory is most important in spelling.[7]

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[1] THORNDIKE, E. L.· *Teachers' College Record*, May, 1901. *The Need for Fundamental Analysis —Elementary School Journal*. Vol 30. p 189.

[2] ZYVE, C: *An Experimental Study of Spelling Methods —Teachers' College Contributions to Education*, No. 466 (Columbia University, 1931)

[3] GATES, A I *An Experimental Comparison of the Study-Test and Test-Study Methods in Spelling —Teachers' College Record*, Vol 33 (Columbia University, 1931)

[4] GREEN, H A *Syllabification as a Factor in Learning to Spell —Journal of Educational Research*, Vol 8, p 206, 1923

[5] STEAD, H E *Spelling Errors in Children —Journal of Experimental Pedagogy*, Vol 2, p. 362, 1913

ALLEN, L. H *Records of the Education Society* Teachers' College, Sidney, No. 37.

[6] BRIERLEY, S S · *Analysis of the Spelling Process —Journal of Experimental Pedagogy*, June, 1918

[7] GATES, A I, AND CHASE, E H *Methods and Theories of Learning to Spell, tested by studies of Deaf Children —Journal of Educational Psychology*, Vol 17, p 289, 1926

CARROLL, H A; *Generalisation of Bright and Dull Children a Comparative Study with Special Reference to Spelling —Journal of Educational Psychology*, Vol 22, p. 489, 1930

(3) Devices are useful which concentrate attention first upon the word as a whole. Attention should be directed to structural difficulties in the word, such as double or silent letters [1] It has been found by Schonell that children at the ages of 7 and 8 find most difficulty with the consonantal digraph and the silent vowel After the ninth year there is a diminution of error with silent consonants which has been attributed to improvement in visual memory Most errors are occasioned by double letters, silent consonants, and vowel digraphs and they occur most frequently in the middle of a word, as attention is chiefly paid to the first and last portions of it It is advisable to group words for learning according to common structural elements.[2]

(4) Homonyms should be presented together only when the pupils are familiar with the words concerned [3]

(5) A few simple rules, of wide application, should be taught, as these provide certain principles to be used in time of difficulty. One study suggests that rules might well be memorized with regard to the following

(1) Final mute "e"
(2) Final "y."
(3) Doubling final consonant.
(4) "i" before "e" (except after "c" and when sounded like "a" in "neighbour")[4]

(6) In order to stimulate learning, it is best to present the word in as many different contexts as possible For instance, it should be included in the material read soon afterwards [5] It is easier to learn words in columns, but, in the case of older children, the best results from learning are obtained when the word is also used in a sentence [6] Most American investigators, working with lists of words to be acquired each month, favour the "Test-study" system, only those words need be studied which the pupil has failed to spell correctly in the preliminary test. It is not advocated, however, for the very young or the very backward.[7]

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[1] TIDYMAN, W F, AND JOHNSON, E. *The Value of Grouping Words according to Similar Difficulties in Spelling*—*Journal of Educational Research*, Vol 10, p 297

[2] MENDENHALL, J E · *The Characteristics of Spelling Errors*—*Journal of Educational Psychology*, Vol 21, p 648

[3] SUZZALLO, H *The Teaching of Spelling*—*Teachers' College Record*, Vol 12, p 259, 1911

[4] ALMACK, J C, AND STAFFELBACH, E H *Method in Teaching Spelling*—*Elementary School Journal*, Vol 33, p 175

Related Factors in Spelling—*Elementary School Journal*, Vol 33, p 273

[5] GILBERT, L C *Effect of Reading on Spelling in the 9th Grade*—*School Review*, Vol 42, p 197, 1934

[6] DISTAD, H. W, AND DAVIS, E M. *A Comparison of the Column Dictation and Sentence Dictation Spelling with Respect to the Acquisition of the Meaning of Words*—*Journal of Educational Research*, Vol. 29, p. 352, 1929

[7] GATES, A I *An Experimental Comparison of the Study-Test and Test-Study Methods in Spelling*—*Teachers' College Record*, Vol. 33, 1931

(7) There is some evidence that the most effective way of dealing with spelling mistakes in written work is for the child to cross through the error and write the correction above [1]

(*c*) *Disability*.

Reading and Spelling are closely allied. One American investigator, M. Monroe, found co-efficients of correlation so high as to suggest that spelling is " an achievement that is greatly dependent upon reading or upon the same factors which underlie the ability to read "[2] Backward spellers have difficulty with word perception [3] Eye-movements are badly adapted to the end in view and they fail to grasp words as wholes.[4] Sometimes they have a short memory span or a poor visual memory; in the first case they should practise words as wholes, in the second, phonic analysis is helpful F. J Schonell found definite weakness in composition, and, he concluded, disability in a specific factor pertaining to the use of words. Social surroundings have considerable influence upon the level of attainment, the difference between that of good spellers in good surroundings and in poorer surroundings amounting almost to a mental year in younger groups and to between 18 months and 2 years with pupils of 11, 12, and 13 The weakness in spelling shown at school often persists into adult life.[5]

Backward spellers among children are often, though not necessarily, of low intelligence but one of those investigators who find only a low co-efficient of correlation between intelligence and spelling declares hopefully that it should be possible to teach " almost anyone to spell."[6]

2.—*Formal Grammar*.

Most of the objective studies in this section of English work are occupied with the investigation of the claims made for the study of

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[1] Wyatt, S *Journal of Experimental Pedagogy*, Vol 2, 1913

[2] Monroe, M *Children who cannot read*—*Behaviour Research Monograph*, Chicago, 1932, p. 13

[3] McGovney, M *Spelling Deficiency in Children of Superior Ability*—*Review of Educational Research*, Vol I, No. 5, p 343, 1931

[4] Gilbert, L. C *Experimental Investigation of a Flash-card Method of Teaching Spelling*—*Elementary School Journal*, Vol 32, p 337

[5] Schonell, F J *An Investigation into Disability in Spelling*—*Ph D Thesis* (University of London, 1932.)

The Relation between Defective Speech and Disability in Spelling—*British Journal of Educational Psychology*, Vol 4, Part 2, p 123

Ability and Disability in Spelling among Educated Adults.—*British Journal of Educational Psychology*, Vol 6, Part 2, p 123

[6] Guiler, W S *Spelling Diagnosis and Remedial Teaching.*—*Elementary School Journal*, Vol 34, No. 5, 1934.

Formal Grammar in the Elementary School and in the High School, quoted by F. S. Hoyt, namely, that it:

(1) Disciplines the mind.
(2) Prepares for the study of other languages
(3) Gives command of an indispensable terminology
(4) Enables one to use better English.
(5) Aids in the interpretation of literature.[1]

The evidence they offer has helped to create the present state of divided opinion with regard to this subject. Hoyt and others found that, in the case of the Elementary School child, instruction in formal grammar has little influence upon ability to interpret the meaning of a passage of poetry (a conclusion which few would dispute) and upon ability to write correct English in composition[2] According to his interpretation of the test results, the particular kinds of ability needed for composition, interpretation, and grammar are independent of each other Hoyt carried out his experiment in 1906, before standardized tests were available Later investigators, using standardized grammar tests and composition scales, give higher co-efficients of correlation than Hoyt and Rapeer, in the case of both Elementary and High School pupils,[3] but they agree that "grammar taught as an Elementary School subject has functioned inadequately."[4] An experiment very carefully conducted by F G Adams in a Bethnal Green Senior Boys' School shows that boys who received instruction in literature over a period of 33 weeks wrote better and more accurate compositions than those instructed in grammar[5] An American study found that, although clever children can apply a knowledge of the rules and definitions of grammar to the correction of sentences, the process is too costly for the average child.[6] Moreover, instruction in formal grammar is of little benefit to the Elementary School child as training in logical thinking.[1] The reason for this is the difficulty of the subject for the immature mind.[2]

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[1] HOYT, F. S. *The Place of Grammar in the Elementary Curriculum.—Teachers' College Record*, Vol 7, p 467. (Columbia University, 1906)

[2] RAPEER, L. W · *The Problem of Formal Grammar in Elementary Education.—Journal of Educational Psychology*, March, 1913 Summarised by R L Lyman —*Supplementary Educational Monograph*, No 36, p 21 (Chicago, 1929)
SCHACHTMAN, J *Elements of English Related to the Judgment of Poetry —Teachers' College Record*, Vol 31, p 262 (Columbia University, 1929)

[3] SEGEL, D, AND BARR, N R *Relation of Achievement in Formal Grammar to Achievement in Applied Grammar —Journal of Educational Research*, Vol 14, p. 401, 1926
JAMISON, G S. *A Study in Correlation of Allied English Abilities.—Journal of Educational Research*, Vol 6, p 241, 1922
SUMMERS, A M *Review of Educational Research*, Vol 1, No 5, p 219

[4] BORAAS, J *Formal Grammar and the Mastery of English.* Summarised by R L Lyman —*Supplementary Educational Monograph*, No 36, p 23. (Chicago, 1929)

[5] ADAMS, F. G *Educational Research*, November, 1932

[6] SYMONDS, P M *Practice versus Grammar in the Learning of Correct English Usage —Journal of Educational Psychology*, Vol. 22, p 81, 1931.

It has been suggested that the minimum of grammar should be taught, in order that pupils should become acquainted with the terminology necessary for the study of foreign languages but the inclusion of formal grammar in the curriculum cannot be justified on the ground that it is a training for any other subject, it must rely upon the intrinsic merit of its own subject matter

Recent American studies offer evidence in support of two alternatives—" functional " and " utilitarian " grammar. The former is defined as " that application of the knowledge of a grammatical item which will prevent the commission of an error in English or will assist in the correction of an error already made " Each item of grammar has been examined and its " functional " value assessed by H. N. Rivlin[3] Only items in this way useful are to be studied. There is, so far, little experimental evidence of the efficacy of this method, but, in the one study available, it is warmly advocated In the Arsenal Technical Schools in America, a certain minimum of grammar must be acquired by all pupils but they may " elect " to do a more advanced course during their four years at school The following are interesting facts with regard to it

(1) Study is not continuous but periodic.
(2) Organization and care of test material is in the hands of the pupils themselves.
(3) The programme begins with practice with sentences as wholes. The first analysis is into subject and predicate parts of speech come late in the course
(4) Practice is given early in the use of different kinds of clauses. also in the correct forms of verbs
(5) The pupils value the course as practical training. Personal ability—not a special sentence-sense—seems to determine the pupils accomplishment in it.[4]

In " utilitarian " grammar, instruction is based upon the pupils' needs and such items and underlying principles are studied as are necessary for the correction of errors made in multiple-choice and language-correction tests and in composition. The system has been successfully applied in the case of 9th and 10th grade pupils[1] The danger is that instruction which does not follow a predetermined course may become desultory and comparatively useless R A. Pritchard, in his estimate of the popularity of school subjects, notes that " above 14½ the objection to grammar is not particularly mentioned "[2] The experiments with functional and utilitarian grammar were made with pupils of over 14 years of age, capable of understanding the language principles involved.

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[1] BRIGGS, T. H *Formal English Grammar as Discipline.—Teachers' College Record*, Vol. 14, p. 251 (Columbia University, 1913)

[2] BALLARD, P B *Teaching the Mother Tongue*, p 32, 1921
FOWLER, H L. *The Development of Concepts—M A Thesis* (University of London, 1931)

[3] RIVLIN, H. N. *Functional Grammar.—Teachers' College Contributions to Education*, No 435 (Columbia University, 1930.)

[4] SHOVER, E. F: *How much English Grammar can High School Pupils Learn?—English Journal*, Vol. 23, No 7, p 568, 1934

3.—*Applied Grammar.*

A large number of American studies deal with language practice work for the eradication of errors, without instruction in formal grammar. Errors made by children in speech and writing have been listed and classified, and instruction in various States graded accordingly[3] There are two such English analyses of errors made in compositions[4] A series of studies were also made, in America, in the learning of English expression, in order that instruction might be given in the grade where it was most needed[5] There is a quantity of test material for diagnosis and practice Numerous studies measure the progress made by concentrating class drill upon a few essentials.[6] Individual graphs of progress in test scores were found to stimulate learning.[7] Proof-reading appears to be one of the more successful practice tests One experimenter claimed that the progress made in accuracy in punctuation in the practice exercises was carried over into free composition and that the improvement had been maintained when a test was carried out six months later.[8] It is also stated that work with objective practice tests is more efficacious than instruction in formal grammar[1] There is, however, insufficient evidence that the skill gained as a whole is transferred to original work and so far no means of measuring this accurately. One study questions the usefulness of correcting language errors made in compositions[2]; another suggests that such correction is only useful when organized by the teacher into material for class practice[3]; a third offers proof of the "significant superiority of formal drill of the dictation and multiple-response type over the correction of errors made in compositions, in eliminating written errors"[4] Many studies also deal with persistence of error.[5]

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[1] WARNER, P C, AND GUILER, W S *Individual versus Group Instruction in Grammatical Usage*—*Journal of Educational Psychology*, Vol 24, p 140, 1933

[2] PRITCHARD, R A *The Relative Popularity of Secondary School Subjects at Various Ages* (Part 1)—*British Journal of Educational Psychology*, Vol 5, Part 2, p 157, 1935

[3] WILLING, M H *Valid Diagnosis in High School Composition*—*Teachers' College Contributions to Education*, No 230 (Columbia University, 1926)

LYMAN, R L *Summary of Investigations relating to Grammar, Language and Composition*—*Supplementary Educational Monograph*, No 36 (Chicago, 1929) *Elementary School Journal*, Vol 32, p 266, 1932

[4] BALLARD, P B *Group Tests of Intelligence*, p 247, 1922

CHAPMAN, A E *An Analysis in English Composition*—*Forum of Education*, Vol 7, p 3, 1929

[5] SYMONDS, P M, AND OTHERS *Studies in the Learning of English Expression*—*Teachers' College Record*, Vol 30, p 461; Vol 31, p 50, Vol 32, p 50

[6] *Review of Educational Research*, Vol 1, No 4, p 268

[7] O'BRIEN, F P *An Experiment in Supervision of English*—*Kansas Studies in Education*, Vol 1, No 6 Summarised by R L Lyman—*Supplementary Educational Monograph*, No 36, p 245

[8] LEONARD, J P. *Use of Practice Exercises in the Teaching of Capitalization and Punctuation*—*Teachers' College Contributions to Education*, No 372 (Columbia University, 1930)

There is sufficient coincidence between the evidence of American and English analyses of errors to enable us to recognize those items of language construction which, judging by the percentage of error and error quotients, give most trouble to children. In order of frequency they are as follows.

(1) The sentence as a unit—the complete thought
    (a) The use of the initial capital letter and the final period or full stop.
    (b) Avoidance of a series of sentences loosely strung together with "and."
    (c) Avoidance of loose participial constructions.
    (d) Avoidance of vague "so" and "only" clauses.
(2) Agreement:
    (a) In number, between verb and subject—especially in the case of the indefinite pronoun-subject, e g, everybody
    (b) In number, between pronoun and antecedent.
(3) Use of the capital letter for proper nouns and adjectives derived therefrom
(4) The case forms of pronouns—particularly the relative "who."
(5) Verbs:
    (a) Correct tense forms of verbs—especially irregular and "strong" verbs.

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[1] Maloney, E L , and Ruch, G N *The Use of Objective Tests in the Teaching of Grammar as illustrated by Grammar*—*School Review*, Vol 37, p 62, 1929

[2] Norton, C I *The Value of Theme Correcting in High School Composition Classes* Summarised by R L Lyman—*Supplementary Educational Monograph*, No 36 (Chicago, 1929.)

[3] Ranson, G *Remedial Methods in English Composition*—*English Journal*, Vol 22, No. 9, p. 749, 1933.

[4] Thomas, J. E: *Eliminating Written Errors through Drill.*—*Review of Educational Research*, Vol 2, No 1, p 40, 1932

[5] Guiler, W S *Improving Instruction in English Mechanics*—*Elementary School Journal*, Vol. 34, No 5, 1934.

(*b*) Avoidance of the use of the past participle in place of the past tense, e g, I done it

(*c*) Correct sequence of tense.

Willing, who has carried out several investigations of the subject, stated, ten years ago, that "correction of error" tests—indeed standardized language tests of any kind—simply measure a pupil's power of correcting other people's errors They do not measure the number of errors he himself is likely to make in free composition [1] A recent study has confirmed the assertion that the two processes are entirely different [2] So far, the only means of testing potential error in composition is to set a composition We have only a vague impression as to the type of error evoked by different composition subjects. It is more important that the habit of correct speech should be acquired as early as possible than that an attempt should be made to eradicate errors that have become habitual The comparatively low correlations between intelligence, as measured, and correct writing found by some investigators, emphasize the importance of habit in the use of language [3] Two recent studies show that the same principles of learning apply in the acquisition of correct language structure as in reading and spelling. In the case of young children much may be accomplished by sheer learning, more by learning enlightened by understanding of its purpose, most by a variety of drill procedure.[4] "The line of development of language as of perceptions is from the whole to the part"[5] In the teaching of language we should concentrate first upon "wholes", practise with whole sentences, simple, double, and complex; then proceed to some simple analysis and not attempt reasoning about words until the pupils are ready for it—probably after the age of 14. "The formal review of grammar" should be placed "at the end of a cumulative learning programme" when "the principles and usages to be formally organized have been, for the most part, practised and understood by the pupils for some time"[6]

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[1] WILLING, M H, *Practice Exercises in the Mechanics of Written English for the High School*—*Lincoln School Publications*, 1928

Individual Diagnosis in Written Composition—*Teachers' College Record*, Vol 32 (Columbia University, 1931)

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VI.—WRITTEN COMPOSITION.

The inferences drawn from objective estimates of various aspects of written composition are suggestive rather than proven and, so far, only a tentative acceptance of them is possible.

There have been three investigations of the relationship between oral and written composition. Oral work is found to be not distinctive from written work but simply inferior to it; sentence structure, for example, is much looser[1] Skill in written expression develops at the expense of oral composition and it is wellnigh impossible to ensure parallel development[2]

Other studies offer evidence of a close relationship between inventive ability and accuracy of form[3], where substance and arrangement are good, there will be found " a reasonable command of the mechanics of writing."[4] It is therefore suggested that the teacher should be more concerned to stimulate invention, to give pupils help in the collection of material, than to provide drill in accurate expression.[5] Most of the interesting devices for the composition lesson, such as the building of mind pictures,[6] debates, activity or " project " stimulation, are attempts to combat the pupil's depressing conviction that he/she has " nothing to say," which prevents anything in the nature of a satisfying performance.[7]

An investigation of the preferences in composition subjects of children of different grades in American schools has made it clear that

(1) Up to the age of 12-13 they enjoy writing about " personal " things.

(2) As they become older, the more intelligent turn to the " exposition " and the " argument"; to the subjects that draw upon

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their knowledge of history, geography, and politics,[1] while some never get beyond the perceptual level and would never be happy with an " abstract " subject.[2] This would appear to be true of English children also.

More recent investigators have been considering the influence of the nature of the subject, or " theme " set, upon composition ability They find that the best written work is the result of preparation, either by discussion, plan, or the actual reading of a story to be reproduced . the best and most accurate results are obtained when composition is a natural creative activity, arising out of interest in the subject or out of some scheme of action of which it forms a necessary part[3] This has been found particularly true of backward pupils.[4] If time is allowed for revision, pupils learn to identify and correct a considerable proportion of the mistakes made.[5] Free choice of subject and medium of expression also stimulates accuracy[6] It cannot be said that any particular subject is necessarily attractive to a pupil at any particular time, but, when the subject is congenial, a good composition is written upon it The evidence available indicates that the writer is not necessarily aware of the special appeal of the subject, since he does not always produce his best work upon a theme he has chosen for himself[7]

Perhaps in no other branch of English work is individual variation in achievement as marked as in the writing of compositions. There is considerable overlapping in the classes in a school. Hudelson, whose study covers Grades 7 to 12, found "far more difference on each assignment and on all assignments between pupils in any one grade than there was between the medians of the 7th and 12th grades."[1] Also the standard attained by individual children and groups of children varies with the subject assigned.[2]

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[7] WISWALL, Z E . *A Study of Sentence Structure in 8th Grade Composition* —*Elementary School Journal*, Vol 26, p 441, 1926

There has been little direct investigation of disability, but Professor Burt and Dr Ballard have written about the subject and Dr Schonell is at present conducting an investigation in some London Elementary Schools The psychology of composition is not complete but some points of interest have become clear by reason of the evidence of certain studies. We know that lack of interest in books and limited vocabulary are handicaps to the would-be writer. Moreover, vocabulary has been shown to be closely connected with level of intelligence and with special interests.[3] Level of intelligence has been shown, in some studies, to have little correlation with grammatical accuracy in writing,[4] in others, to be significantly related [5] It has, however, significant influence in the case of general composition ability.[6] Huxtable found a high co-efficient of correlation between a pupil's Intelligence Quotient and the complexity of thought he expressed, and considered that there was "sufficient evidence to indicate that the relation should be consistent throughout."[7] In an English experiment with students of a Technical College, it was found that logical ability, which has been shown to be related to a significant degree with intelligence, was more important in the writing of essays than appreciation of the æsthetic value of words.[8] Such a conclusion is easily intelligible, since, when writing an essay, all the material relative to the subject in hand must be reviewed by the mind, a selection made and the selected material arranged in orderly sequence. In this matter, training is possible and instruction and practice can be given. But the most attractive essayists possess other qualities—a fluency of vocabulary and a subtlety in its use, a certain smoothness and balance of sentence structure, and an attractiveness of phraseology—which are the reflection of personality.

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[6] LOCKWOOD, H. R *Correlation of the Mental Ability of* 100 *College Freshmen and their Ability to write English Composition* Summarised by R L Lyman —*Supplementary Educational Monograph*, No. 36, p 175 (Chicago, 1929)

[7] HUXTABLE, Z L · *Criteria for Judging Thought Content in Written English —Journal of Educational Research*, Vol. 19, p 188

[8] SCRIVENS, A G *An Objective Study of the Factors underlying Ability in Verbal Expression —M.A Thesis* (University of London, 1933)

This necessarily personal element in composition makes it difficult material for objective experiment It is impossible to be certain that any two subjects will be of equal appeal, it is difficult to isolate the various elements of substance and form for testing purposes and measurement, since an essay is essentially a unity, moreover the level of performance of the same writer varies from time to time. The average markings which are necessary in the computation of results are, therefore, particularly unreliable

VII.—THE RATING OF COMPOSITIONS.

The marking of compositions is the result of a personal judgment on the part of the marker and there is ample evidence, in America and England, of the variability of judgment as between one person and another, and also the same person on different occasions.[1] Attempts were made in America, as early as 1912, to standardize the marking of compositions There are now numerous Composition Scales, the result of very careful computation, in which items characteristic of different grade levels are rated according to general merit One of the best known of these and most widely used is the Nassau Extension of the Hillegas Scale, which contains ten samples, graded on a ten-point scale The Harvard-Newton Scale and the Van-Wagenen Scale measure specific qualities, the latter requiring three separate gradings of each composition. The scales are intended for use in comparing the achievement of pupils in different schools and school systems and not as a teaching device The two English Scales—W Boyd's Measuring Devices in Composition,[2] and the Northamptonshire Composition Scale[3]—offer compositions at a definite level, that of a particular examination, and are for the use of teachers as an aid in their own marking. The Northamptonshire Scale is the more comprehensive and seems to combine the elements of the two American types The allotment of 30/50 marks for thought is almost in the nature of a general estimate of value, while the different elements of structure are analysed separately.

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[1] THOMSON, G H., AND BAILES, S M *The Reliability of Essay Marks —Forum of Education*, Vol. 4, p 85, 1926

VALENTINE, C. W · *The Reliability of Examinations*, 1932

HUDELSON, E *Diversity of Judgment upon Standards of Content and Achievment in English.—Teachers' College Record*, Vol 27, p 33 (Columbia University, 1925)

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There is some evidence in American and English studies that it is possible by means of practice to train one's judgment into line with the standard judgment and so reduce variability[1]

VIII.—Some general conclusions.

Achievement in English work.

It appears, from the evidence of objective studies, that achievement in English work is chiefly dependent upon verbal ability, that is, a special understanding of the significance of words and the skill to use and apply them. Training and experience are important to the development of this skill, and intelligence is particularly significant, since it limits the extent to which advantage is taken of training and experience. An æsthetic sense of the value of words, the power of imagery, sensitiveness to rhythm, all appear to be involved, though we have yet to demonstrate that they are " factors " in a mathematical sense.

The learning process

The general principles of learning involved in the studies are equally true in England and America and influence the choice and presentation of material

1 —*The concept of wholeness.*

Objective studies offer a good deal of evidence in support of the " Gestalt " theory of " the organized wholeness of behaviour " in respect of learning. Laboratory studies have shown that, in reading, both the child and the adult sees the word, the phrase, and the sentence as wholes Any slight mistake or misplacement of letters is automatically, often unconsciously, rectified by the reader. When memorizing the spelling of a word, we take in its appearance as a whole, before we analyse it into syllables or sections for learning. The long complete lesson makes the most impression upon children ; the child prefers a complete story to a selection, the older pupil remarks upon the general effect of a poem upon the feelings and does not become aware of separate qualities of style until attention is directed towards them. Coryell's experiment showed that pupils of 16, or thereabouts, obtained a store of information from the study of a group of books which enabled them to equal the examination score made by other pupils who had studied a few items in detail. The substance of a free composition, which is a self-contained whole, influences both the nature of the sentence structure and vocabulary used and also the correctness of the expression

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[1] Pu Hwang, · *Errors and Improvement in Rating Compositions by Means of a Composition Scale —Teachers' College Contributions to Education*, No 417 (Columbia University, 1930)

The value of the "concept of wholeness" is already recognized to a certain extent in the teaching of English but its implications are far-reaching and should influence the substance of the English curriculum and teaching method more than they do at present. The comparative failure of certain procedures to effect successful learning may be partially attributed to the fact that integration into a "whole" is not possible to the learner. Examples of this are the ill-effects upon reading ability of unwise emphasis on phonetic analysis, the lack of evidence, up to the present, of the value of correction of errors made in compositions and the small amount of improvement made on language tests by children who practised the correct form of expression only, without reference to anything else, as in Symonds' experiment. Further, pupils show little interest in acquiring knowledge of grammar rules, which appear to lead nowhere and to be connected with nothing interesting, until they are old enough to realize that the rules form a certain logical structure and they "see what it is all about" In the teaching of language, therefore, the principle of the perceived whole could be more fully applied than it is at present, in accordance with the findings of observational and classification studies.

2.—*Rules and plans.*

A rule of general application, a type of procedure or a principle of method which the pupil may use in successive situations, has been demonstrated as another effective tool of learning Phonic analysis in reading—to mention but one example—is useful in that it enables the pupil to deal with the pronunciation of new words

3.—*Class repetition*

Some studies provide evidence in support of the repetition methods which were once too much used in schools and then too much cond mned It has been found that most progress is made by 11-12 year-old where rationalization is aided by the presentation of material in various contexts The value of variety in stimulating learning by arousing interest and at the same time ensuring repetition has been empirically established in the teaching of both composition and literature. With pupils of 13-16 years, we infer that understanding of the significance of what they are doing is more important than sheer repetition

4 —*Organization*

With respect to those abilities which depend largely upon habitual response, i.e., reading, spelling, etc., learning is greatly facilitated by careful organization and grading of subject matter and continual testing of achievement.

The influence of intelligence.

A knowledge of the I.Q., as determined by verbal intelligence tests, of each child at the age of, say, 10-11 years, is of considerable value to the Secondary School English teacher. Comprehension of the written word correlates highly with both intelligence and word knowledge and depends upon them both. Verbal intelligence tests measure these very qualities, among others. If a child's I.Q. is low, therefore, it is clear that special consideration will be necessary. If there is a marked discrepancy between the level of intelligence and attainment in English work, there is probably some special disability to be reckoned with. If this is recognized early in a child's school life steps may be taken to deal with the trouble before it becomes deeply engrained.

Further research needed.

The lack of much definite information as to the psychology of composition and of the appreciative process, its development and training, is largely, as has been shown, the result of the difficulty that exists in isolating the various elements of these complex processes and in holding other factors constant while we experiment with one variable in the situation. Further, improvement in achievement is often so slow as to invalidate any attempt to control conditions. In essay writing, power seems to develop as the individual matures, it is almost impossible to measure improvement, over six months for instance, with a general composition scale Literary judgment, an even slower growth, often does not appear at all during school life. When more complete evidence becomes available, the teaching of composition and of literature may be placed, like the teaching of reading, upon a sound psychological basis. The information supplied by investigators up to the present provides a useful commentary upon present methods.

Résumé.

UN EXAMEN CRITIQUE DES APPRÉCIATIONS OBJECTIVES DANS L'ENSEIGNEMENT DE L'ANGLAIS

Ce qu'on résume ici ce sont les résultats d'un examen critique et d'une évaluation des études objectives dans l'Enseignement de l'anglais. L'on traite, tour à tour, le développement du pouvoir de l'expression, la lecture, la littérature, l'appréciation de la littérature, l'orthographe, la grammaire anglaise, formelle et appliquée, la composition et l'évaluation de la composition. L'on démontre la psychologie de chaque section, telle qu'elle se révèle dans le travail expérimental, et l'on explique les recommandations quant aux méthodes de l'enseignement, basées sur cette psychologie L'on conseille qu'en général l'enseignement doit suivre " la ligne de développement du langage . . . de l'ensemble aux parties " L'on démontre que c'est l'enseignement de la lecture qui a le plus profité du travail expérimental, puisque c'est dans cette branche que les connaissances psychologiques sont les plus étendues. Dans la littérature et la composition, au contraire, elles sont plutôt maigres et les méthodes de l'enseignement ont été établies d'une façon empirique

Zusammenfassung

KRITISCHER ÜBERBLICK ÜBER SACHLICHE WERTUNGEN IM ENGLISCHEN UNTERRICHT.

Der Uberblick, der hier zusammengefasst wird, ist das Ergebnis einer kritischen Prüfung und Auswertung sachlicher Untersuchungen im englischen Unterricht Die Entwicklung der Ausdruckskraft, das Lesen, das Verständnis und die Würdigung der Literatur, die Rechtschreibung, die formale und die angewandte englische Grammatik, der Aufsatz und seine Bewertung werden der Reihe nach behandelt Die Psychologie jedes Abschnittes, wie sie durch experimentelle Arbeit aufgedeckt wurde, wird skizziert, und die Empfehlungen, die auf diese psychologischen Untersuchungen aufgebaut sind, werden herausgestellt Im allgemeinen wird befürwortet, dass der englische Unterricht dem Entwicklungsgang der Sprache—vom Ganzen zum Besonderen—folgen sollte Es wird gezeigt, dass der Unterricht im Lesen aus der experimentellen Arbeit den grössten Nutzen gezogen hat, da die psychologische Kenntnis über dieses Fach am umfassendsten ist. Im Hinblick auf Literatur und Aufsatz dagegen ist sie verhältnismässig spärlich, und die Lehrmethoden sind empirisch aufgestellt worden

OBJECTIVE TEST FORM IN A SCHOOL CERTIFICATE EXAMINATION.

By R. K. ROBERTSON AND F. G. TRYHORN.

I.—*Aim of the experiment*
II.—*Preparation of the objective test form.*
III.—*Criteria for the choice of items.*
IV.—*Experiment and results.*
V.—*Conclusion.*
VI.—*Appendix samples of test and examination questions*

I.—AIM OF THE EXPERIMENT.

WHAT is here called " Objective Test Form " is a form of examination in which the questions are so phrased that the answers are either right or wrong, the judgment of the marker does not enter into the assessment of the marks This experiment was undertaken to discover whether the advantages of this form could be obtained in a School Certificate Examination in chemistry without sacrificing any of the good points of the present type of examination

The advantages of the objective test form are

(1) That marking does not vary as between examiners
(2) Using a stencil or strip key, marking is usually more rapid, and often this enables two independent checkings to be made,
(3) The marking can be done by clerks. it does not involve knowing the subject.

II.—PREPARATION OF THE OBJECTIVE TEST FORM.

The examination paper set by one of us for the Northern Universities' Joint Matriculation Board School Certificate and Matriculation Examination in Chemistry in September, 1933, was used as the basis of the test paper The examination paper consisted of two sections, A and B. Section A consisted of questions to which thirty-one short written answers were demanded Candidates were given one hour to answer this section Section B had seven questions, of which five had to be answered by short essays, sketches, etc Section A only was used for this experiment.

The Northern Board very kindly provided 100 marked scripts of the September Examination, and 200 papers for use in the experiment. The wrong answers provided alternative answers for the multiple-choice items for the objective test form, and the questions were analysed and broken down into as many independent items as possible. For example, it was found that the errors in writing chemical equations arose from

(1) Not knowing the formulæ of the substances named,
(2) Not knowing what substances were formed in the reaction.
(3) Not being able to write the formulæ for the substances formed
(4) Knowing all these things, not being able to form a balanced equation

The most frequent fault was the second. In the test form each of these possible errors could be tested for by separate questions, and this procedure was adopted wherever it was possible.

The test thus made was given a preliminary trial in school P, with two matriculation classes of twenty-seven and twenty-two boys. The chemistry master furnished an estimate of the ability of his pupils in chemistry, in the form in which he is accustomed to give such an estimate to the Northern Board, in percentages. This estimate was correlated with the result of the test, using Pearson's product-moment correlation All the correlations quoted in this paper are Pearson coefficients, usually calculated by the diagonal adding method. Promising values of 69 ± ·071, and ·85 ± ·04, were obtained from this try-out The items of the test were examined by the method described in the next paragraph, and alterations made where necessary, this corrected form was used in the experiment proper Examples of the questions, together with the examination questions on which they were based, are given in the appendix.

III.—ESTIMATION OF THE VALUE OF A TEST ITEM.

To estimate the value of a test item as a unit in the whole test, to measure how much each individual item contributes to the discrimination made between candidates by the test, we may use two different criteria. We may calculate the difficulty of the item by finding what percentage of pupils, of the age and at the stage for which the test is intended, pass on the item It is obvious that if no candidate passes on a particular item the item is valueless, as it makes no discrimination within the group The same is true of the item which is passed by all, and the same is very nearly true of the item passed by one, or by all except one, candidate. This argument leads to the conclusion that an item of about 50 per cent difficulty is ideal T. G Thurstone[1] shows that items of difficulty between 30 per cent and 70 per cent make the greatest contribution to a test, "pull their weight" best. Items with difficulty values outside these limits quickly decrease in value; items of 50 per cent difficulty are little better than those of 30 per cent or 70 per cent the curve of value against difficulty is shaped like an inverted U, symmetrical about a maximum of 50 per cent The value of an item was measured by the correlation of a test made of such items with a trustworthy criterion score, i e., the test of value was one of validity

The second method is to discover how far an item discriminates between those who do well in the whole test and those who do badly, or between those who are known to be good by some outside criterion and those known to be bad Like the one above, this method can be used either to increase the reliability or the validity or first the one and then the other Various measures of this item value, or discriminative value, have been proposed, and several such methods are discussed in a paper by Lenz, Hirshstein and Finch [8]*

In the construction of tests it might be desirable first to calculate the difficulty value of each item, and discard those between 0 per cent and 30 per cent, 70 per cent and 100 per cent. The remainder could then be examined by calculating $\frac{U-L}{U+L}$ or $\frac{U}{L}$, and the best items by this measure included in the final test.

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* They conclude that the function $v = \frac{U-L}{1/3\,N}$ gives the best measure of the value of a test item, U being the number passing the item in the top one-third of the group, L the number passing in the lowest third, N the total attempting the item The top and bottom thirds are decided by placing the papers in order of total score, in this case the criterion is one of reliability Hardy and Lenz[8] show that the reliability of a test may be predicted with a high degree of accuracy from the average item value, v, obtained from the above formula, and that the higher the value of v, the higher the reliability of the test The relationship between the reliability and the average item value is given by the formula $r = 1-(1-v)^{3}$ [illegible] It may be noted in passing that this method could be used to increase the validity of a test were the top and bottom groups chosen by reference to the outside criterion, and also that, as Hardy and Lenz point out, the best fraction to take in cutting off the top and bottom groups has yet to be determined.

This v measure is subject to the serious limitation that its value depends on both the difficulty and the extent to which the item picks out the good and the bad If we may christen the second factor discriminative value, we may wish to know what contribution is made by this alone, or by difficulty alone For example, compare these two items

(*a*) $U = 500$, $L = 100$, $1/3\,N = 1{,}000$, $v = 0\ 4$, $D = 30$ per cent, taking $\frac{U+L}{2/3\,N} = D$, as an approximate measure of difficulty

(*b*) $U = 50$, $L = 10$, $1/3\,N = 1{,}000$, $v = 0\ 04$, $D = 3$ per cent

Item (*b*) might be useful in a test at a higher level, though not suitable, because of its difficulty alone, for a test at this level Compare it with a third item

(*c*) $U = 540$, $L = 500$, $1/3\,N = 1{,}000$, $v = 0{\cdot}04$, $D = 52$ per cent This item is probably useless for this type of test at no matter what level of difficulty

We can obtain a measure of discriminative value independent of difficulty if we use some function of U and L not involving N, U/L or $U-L/U+L$ are such functions The second is probably the more convenient Its value varies between 1 and -1, and it is related to v above, being, in fact, equal to $v/2D$ (*a*), (*b*) and (*c*) have values of U/L equal to 4·0, 4 0, and 1 08 values of $U-L/U+L$ equal to 0·66, 0 66, and 0 038.

In the present study this was not fully understood when the test paper was constructed, and the group of pupils on whom the test was tried out (School P) was neither numerous enough nor sufficiently like the pupils who took the final test (In fact, they had not completed their revision for the School Certificate Examination) The percentage difficulty and the $\frac{U}{L}$ value obtained from the first try-out were therefore used only as general guides, not in every case to be relied upon as against the judgment of the constructer of the test The $\frac{U}{L}$ value is given for each question in the appendix.

IV —THE EXPERIMENT.

The school certificate classes in chemistry in three secondary schools worked the test paper and Section A of the matriculation paper One hour was allowed for each paper From each school an estimate of the ability of the pupils on a percentage scale was obtained from the chemistry master The school certificate papers were marked by one of us who acted as Chief Examiner for Chemistry to a Matriculation Board for a number of years Correlations were calculated for the three combinations of marks and estimate, using Pearson's r.

INTERCORRELATIONS, SCHOOL CERTIFICATE PAPER, TEST PAPER AND SCHOOL ESTIMATE

Correlation between	*Q*		*R*		*S*	" *R* "
School Class	*a*	*b*	*a*	*b*	*a*	
School Certificate Paper, Section A, and Test Paper	81	57	80	84	·87	80 ± ·022
School Certificate Paper, Section A, and School Estimate	73	93	82	67	77	·80 ± 022
Test Paper and School Estimate.	·59	68	74	77	64	·69 ± 032
Number in Class . ..	29	25	29	24	31	27

The column headed " R " gives the best estimate of the correlations between the two factors, using Fisher's z transformation, but the P E is estimated by the usual method.

Speed of Marking.—The school certificate paper, Section A, can be marked by competent examiners at fifteen to twenty scripts per hour. The test paper can be marked by clerks at the rate of thirty to sixty scripts per hour Both rates include time for addition of marks

V.—CONCLUSIONS AND DISCUSSION

Judged by agreement with teachers' estimates, the objective test form of the school certificate examination paper in chemistry is only slightly inferior to the short answer form which is at present used. The correlation between the teacher's estimate and the test form is ·69 ± ·032, which is satisfactory for a first attempt The correlation between the short answer form and the teacher's estimate is ·80 ± 022. The difference between the two may possibly be accounted for by the introduction of a random scatter in the scores of the test form due to the successful guesses of the pupils, which will add an increment varying in a random manner to their true score, and so depress the inter-correlations. The effect of this random error is difficult to calculate, as the increment varies with the score, being greatest for low scores, least for high scores This attenuation due to guessing will form the subject of a later paper.

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[3] HARDY AND LENZ—*J Ed. Ps*, 1934, p 703

APPENDIX

SAMPLES OF TEST AND EXAMINATION QUESTIONS

1A (1 6)—Define the following terms atom, molecule

1B (2 0)—An atom is the smallest part of any
(1) mixture, (2) compound, (3) element, (4) substance, ( )
which can (1) exist by itself, (2) retain the properties of the substance, (3) take part in a chemical reaction, (4) exist in a gas ( )

2A (1 14).—Name (*a*) Two gases which will burn in air,
(*b*) Two gases which will not burn in air.

2B (7.0).—Put in the brackets the numbers opposite the gases which will burn in air
(1) oxygen, (2) carbon dioxide, (3) sulphur dioxide, (4) hydrogen, (5) ammonia, (6) nitrogen, (7) carbon monoxide, ( ) ( )

3A (3.0).—Give two examples of the formation of a salt by a precipitation process

3B (3 25).—In the four following examples underline the two compounds which will give precipitates of salts when their solutions are mixed
(1) $AgNO_3$, (2) $AgCl$, (3) HNO_3, (4) $NaNO_3$, (5) HCl. ( ) ( )
(1) $BaCO_3$, (2) $BaSO_4$, (3) $BaCl$, (4) $NaCl$, (5) H_2SO_4. ( ) ( )

4A (2 2) —How many grams of sulphuric acid (H_2SO_4) are there in one litre of N/5 solution ?

4B (1.6) —What is the molecular weight of sulphuric acid ?

(1) 49 , (2) 196 , (3) 97 , (4) 82 , (5) 98 ( ) ( )

What weight of sulphuric acid is contained in one litre of N/3 solution ?

(1) 147 grams ; (2) 32⅔ grams ; (3) 65⅓ grams ; (4) 27⅓ grams ; (5) 16⅓ grams. ( )

RÉSUMÉ

UNE FORME OBJECTIVE DE TEST DANS UN EXAMEN DU " SCHOOL CERTIFICATE "

L'on prépara une forme objective de test, correspondant autant que possible, article par article, à un examen de chimie du " School Certificate " Ce test et l'examen furent appliqués à 187 garçons dans sept classes qui préparaient cet examen, et l'on obtint des professeurs responsables de ces classes une appréciation de l'aptitude en chimie de chaque garçon La corrélation moyenne entre l'appréciation du professeur et le résultat de l'examen était 0·80 , entre le test et l'examen 0 80 , entre l'appréciation et le test 0 69. L'on suggère que la différence peut s'expliquer par la diminution des notes due à la conjecture. L'on considère des méthodes par lesquelles il serait possible d'évaluer les articles d'un test.

ZUSAMMENFASSUNG

OBJEKTIVER TEST IN EINER SCHOOL CERTIFICATE PRÜFUNG.

Ein objektiver Test wurde ausgearbeitet, der so weit wie möglich Punkt für Punkt den Aufgaben einer School Certificate Prüfung in Chemie entsprach Dieser Test und die Prüfungsaufgaben wurden an 187 Knaben in sieben Klassen gegeben, die Chemieprüfung für das School Certificate abzulegen hatten, und von dem Fachlehrer wurde ein Urteil über die Leistungen der Knaben in Chemie eingeholt Die mittlere Korrelation zwischen dem Urteil des Lehrers und dem Prüfungsergebnis war 0,80, zwischen dem Test und dem Prüfungsergebnis 0,80, zwischen dem Urteil des Lehrers und dem Test 0,69. Es wird angedeutet, dass der Unterschied erklärt werden kann durch die Verminderung der Punktzahlen, die auf das Schätzen zurückzuführen ist. Methoden, die einzelnen Punkte des Tests auszuwerten, werden besprochen.

DICKENS AND CHILD PSYCHOLOGY *

BY BEATRICE EDGELL

I.—*Contrast between valuation of childhood at the present day and at the time of Dickens.*

II.—*Types of children in the novels of Dickens*

- (*a*) *The neglected*,
- (*b*) *The mentally defective*,
- (*c*) *The introspective*,
- (*d*) *The child woman.*

III.—*Descriptions of the mental processes in childhood—Childish memories, emotional life; fear; perception of injustice; inferiority complex.*

I.—CONTRAST BETWEEN VALUATION OF CHILDHOOD AT THE PRESENT DAY AND AT THE TIME OF DICKENS

TO-DAY it is almost a matter of course that children should be prominent in our interests, that they should be studied and considered. The great public services of health and education put the needs of the child in the forefront of their programmes. It is hardly realized how recent is this attitude of society towards children The love of parents for their children is, of course, no new trait in the life of the community, within the family the child has always been something precious. What is of recent growth is the valuation of childhood for its own sake, and a recognition of the importance of the child by the State and by society generally

Eighteen hundred and eighty-one is a cardinal date for child psychology. In that year Preyer's book, "Die Seele des Kindes," was published in Germany. It is the first psychological treatise wherein the child is the central figure and where the interest is scientific rather than didactic. Sully's "Studies of Childhood" appeared in this country in 1895. This book did much to stimulate child study, as did also the society which he founded for that express purpose. Looking back, one may ask what preceded this movement and prepared the way for it?

At the close of the eighteenth century greater attention to the intellectual standpoint of children was evinced by the publication of books suited to their abilities and tastes The name which stands out in this connection is that of the Edgeworths. Mr. Edgeworth, influenced by the theories of Pestalozzi and Rousseau, wrote pedantically on the art of teaching, but his daughter, Maria, reveals in her writing a true insight into the minds of children. In 1791 she began to note down observations about children and to collect anecdotes about them She loved the little people for whom she wrote her moral and instructive tales. "Harry and Lucy," "Frank and Rosamond" are well adapted to the capacities and interests of their readers. Day's "Sandford and Merton," produced at Mr Edgeworth's suggestion, belongs to the same school of thought. Throughout the eighteen hundreds there were stirrings in the educational world, schemes for improved conditions in the education of children and for improved methods of teaching These stirrings were, however, for the most part confined to the few. Something was needed to touch the imagination of the everyday man and woman. This something was, I believe, supplied by Charles Dickens.

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* A paper read at a meeting of the Midland Branch of the British Psychological Society

Dickens helped to bring about a change in the valuation of child-life in two ways, *indirectly* by showing up the wretched conditions which prevailed in the slums of great cities, the corruption and brutality practised in many Poor Law institutions and in private schools, *directly, by revealing to the readers of his novels the inner life of children.* He drew pictures which even the dullest could not fail to understand. It is this direct influence which is stressed here. It is true that Dickens was acquainted with Froebel's aims and with his methods, he wrote an article on these under the title, "Infants' Gardens," in *Household Words* in 1855. But it was not by any such article that Dickens brought home to his fellow men and women the importance of children.

Dickens was the first writer to present children as prominent characters in a novel. Novels as ordinarily conceived had dealt with the lives and interests of adults. If children were referred to they were incidental to the tale and merely figured in the background Even novels that were biographical in form passed rapidly over the childhood of the hero or heroine in the first chapters of the book "Henry Esmond," by Dickens' contemporary Thackeray, is a good example of this Thackeray shows that the circumstances of his birth and early training are influential in the life-story of his hero, but nevertheless he manages to bring Henry Esmond to the age of an undergraduate in the first hundred pages of the novel. How different is the story of "Oliver Twist." Oliver is still only a youth when the tale is finished It is round the adventures of a child that the plot is woven In Dickens' novels children play their parts side by side with the adults in whose company they live Their characters, their ideas, their personal traits, all contribute to the drama which is set forth.

II.—TYPES OF CHILDREN IN THE NOVELS OF DICKENS

(*a*) Many different types of children figure in the novels There are the *miserable down-trodden* children of whom Oliver Twist, Jo, the crossing sweeper, and Smike are outstanding examples. Oliver is the victim of Bumbledom and all its works, Jo the victim of poverty, the child of a pestilent slum, perpetually " moved on," Smike the victim of Mr Squeers at his infamous school of " Dotheboys Hall."

Different, yet equally poor and miserable, are the *combative* children who by their wits put up a good fight against the difficulties that surround them The Artful Dodger, Bayley of Todger's Boarding House, the Little Marchioness, these are Cockney types who might visit the "London Child Guidance Clinic" any day The Artful Dodger is not fundamentally vicious , his smartness and adaptability made him an apt pupil in Fagin's school of crime, but the same qualities might have made him a first class pupil in a trade school Of Bayley, Mrs. Gamp declared . "There is nothing he don't know All the wickedness of the world is print to him." Yet both he and the Little Marchioness, eavesdropper and thief though she be, show devoted service to those who are kind to them. Both win the hearts of the reader Peepy Jellaby furnishes occasion for this thumbnail sketch of the normal adventures of a neglected child .

> " I made my way to the poor child, who was one of the dirtiest little unfortunates I ever saw, and found him very hot and frightened and crying loudly, fixed by the neck between two iron railings, while a milkman and a beadle, with the kindest intentions possible, were endeavouring to drag him back by the legs, under a general impression that his skull was compressible by these means. As I found (after pacifying him) that he was a little boy, with a naturally large head, I thought that perhaps where his head would go his body could follow, and mentioned that the best mode of extricating him might be to push him forward. This was so favourably received by the milkman and the beadle that he would have been pushed into the area if I had not held his pinnafore, while Richard and Mr. Guppy ran down through the kitchen to catch him when he should be released. At last he was happily got down without accident, and then he began to beat Mr. Guppy with a hoop-stick in a quite frantic manner "—(" Bleak House," Ch. 4, p 33*)

That is Peepy's reaction to the situation and it is characteristic

(*b*) Of *the mentally defective* child Dickens has given us a vivid picture in poor Maggie, the faithful shadow of Little Dorrit. Maggie, aged twenty-eight, had been in the charge of a gin-drinking grandmother. She had had a bad fever when she was ten " and has never grown any older since." She could pick out the " fat figures " on price tickets and stumble through notices in the grocers' window She earned her living by running errands and was " as trustworthy as the Bank of England." Dickens realized that such " children " could accomplish much, so long as the tasks assigned to them had a direct practical outcome and were set them by the people whom they loved Few persons recognized this in 1840! The picture of a deranged intellect is given in " Barnaby Rudge " That emotionally unstable youth, born in tragedy, with a horror of blood—a sort of " natural," as the landlord of the " Maypole " styled him, is sketched in against a background in which move other twisted personalities.

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* Page references are to Macmillan's edition of Dickens' works.

Like Maggie, Barnaby can do many practical things, and is trusted with commissions and messages. He can live in a world of his own which is filled with vivid imagery How well Dickens understood such a world is shown by Barnaby's reply to Mr. Chester, who tried to explain to him that what he took to be people were but clothes blowing on a line.

> "Ha ha, how much better to be silly like me than as wise as you! You don't see shadowy people there like those that live in sleep—not you I live a merrier life than you, with all your cleverness. You're the dull men We're the bright ones Ha ha! I'll not change with you, clever as you are "—(" Barnaby Rudge," Ch 10, p 79)

(*c*) A marvellous portrait of the *delicate introspective child* is given in " Paul Dombey " In proportion as such a child is cut off from the more active games and outdoor interests of his fellows, he is driven back on himself and on the study of those around him. Such children gain a remarkable insight into the character of the people they are with Dickens tells how Paul used to sit in his little chair and gaze intently at Mrs Pipchin, that selfish, calculating old dragon who in her own words was " such a great manager of children " The following fragment of dialogue illustrates Paul's knowledge of the lady

> " Mrs P 'Why are you so fond of your sister, Florence ?' 'Because she is very good,' said Paul 'There's nobody like Florence.' 'Well,' retorted Mrs P shortly, 'And there's nobody like me, I suppose ' 'Ain't there really though ? ' asked Paul, leaning forward in his chair and looking at her very hard 'No,' said the old lady 'I am glad of that,' observed Paul rubbing his hands thoughtfully 'That's a very good thing.' "—(" Dombey and Son," Ch 11, p 129)

Dickens adds that Mrs. Pipchin did not dare ask him why, lest she should receive some perfectly annihilating answer. A similar knowledge of the character of those around her is shown by crippled Miss Wren, the doll's-dressmaker in " Our Mutual Friend." She sees through the intentions of Mr Eugene Wreyburn towards her beloved Lizzie, and she pierces the mystery of the money-lending firm of Pubsey and Co. She detects that Mr. Riah, the Jew, is used by the unscrupulous Fledgeby as a cloak for his persecutions.

(*d*) The type which Dickens appears to love best is *the child woman*, the young girl who is the loving capable guardian of some near relative. Such characters are portrayed again and again There is Little Nell, the guardian angel of her grandfather, there is Florence Dombey, the protector of Paul; there is Lizzie Hexham, keeping house for her boatman father, rowing his boat, contriving schooling for her brother Charlie Again, there is Charley Neckett, the orphan of thirteen, who supports her younger brother and sister by going out to do washing, even though she has to wear her dead mother's pattens to reach over the wash-tub Such lives of devotion and service Dickens sketches with a tender hand He gives the same type in the womanhood of Little Dorrit, Agnes Wickfield, Esther Summerson, Lucy Manette.

III.—DESCRIPTIONS OF THE MENTAL PROCESSES IN CHILDHOOD—CHILDISH MEMORIES, EMOTIONAL LIFE, FEAR, PERCEPTION OF INJUSTICE, INFERIORITY COMPLEX.

Turning from the types of children depicted to the more detailed descriptions of the mental processes taking place in the child mind, one finds many such in the two novels written in the first person, "David Copperfield" and "Great Expectations" "Bleak House," which is partly in the first person, also supplies divers psychological reflections It is known that "David Copperfield" is in a measure auto-biographical Through David Dickens describes his own childish experiences

The first objects which David is said to have noticed are faces his mother's face, Peggotty's face. Then there is the touch of Peggotty's hand

> "I have an impression on my mind which I cannot distinguish from actual remembrance, of the touch of Peggotty's hand as she used to hold it out to me, and of its being roughened by needlework, like a pocket nutmeg grater"—("David Copperfield," Ch 2, p. 12.)

Dickens comments that this may be fancy, though he believes that the memory of most of us can go farther back into such times than many of us suppose A point which Dickens stresses more than once is a child's ability to grasp a total scene before him. "I believe the power of observation in numbers of very young children to be quite wonderful for its closeness and accuracy." In his account of the marvels of Mr Peggotty's house David says·

> "All this I saw in the first glance after I crossed the threshold—childlike, according to my theory"—(Ibid, Ch. 3, p. 21.)

In "Great Expectations" Pip in speaking of Miss Haversham's house comments·

> "It was not in the first moments that I saw all these things, though I saw more of them than might be supposed "—("Great Expectations," Ch. 8, p 47)

Another perceptual experience which is noticed is the apparent change in the size of objects which comes when the child is drowsy. David says

> "I had reached the stage of sleepiness when Peggotty seemed to swell and grow immensely large "—(Ibid, Ch 3, p 15)

Of *childish memory* many features are described Dickens may well have himself had eidetic imagery The description of Peggotty's workbox with the sliding lid and the picture of St. Paul's Cathedral, the bit of candle kept for her thread, the account of the crocodile book, of Mr Peggotty's boat and of his own little room there, all these memories of David's have the vividness and the objectivity of eidetic images Dickens also realized how bits of the past stand up above a haze of half-forgotten things like islands above the surface of a sea. Such is David's recall of his father's funeral, such is Esther Summerson's memory of her old doll and of the hearth-rug with the roses on it,

> "which seemed the first thing in the world I had ever seen "—("Bleak House," Ch 3, p 20.)

Dickens knew the capriciousness of a child's memory, and he knew the inhibiting power of fear. David's lessons, however well learned, disappear in the presence of the dreaded Murdstones

> "The very sight of these two has such an influence over me that I begin to feel the words I have been at infinite pains to get into my head, all sliding away, and going I don't know where "—("David Copperfield," Ch 4, p 49)

Dickens knew the way in which fact and fancy become inextricably mixed To David the places round his home became the places in the stories he read "I have seen Tom Pipes go climbing up the church steeple, I have watched Strap, with the knapsack on his back, stopping to rest himself upon the wicket-gate" For Paul Dombey the tick of Dr Blimber's clock said distinctly

> "'How is my lit-tle friend?' 'He was intimate with all the paper-hanging in the house; saw things that no one else saw in the patterns, found miniature tigers and lions running up the bedroom walls, and squinting faces leering in the squares and diamonds of the floorcloth '"—("Dombey and Son," Ch 12, p. 157)

Pip, a child of sturdier stuff, sees the box tree in Miss Havisham's garden as a pudding It

> "had a new growth at the top of it out of shape and of a different colour, as if that part of the pudding had stuck to the saucepan and got burnt."—("Great Expectations," Ch. 11, p 65.)

Of the *emotional life* of children Dickens had a deep understanding No one who has followed David's story could remain thereafter quite blind to a child's capacity for sorrow and bitter despair David was confined to his room for five days after biting Mr. Murdstone's hand

> "The length of those five days I can convey no idea of to anyone They occupy the place of years in my remembrance The depressed dreams and nightmares I had, the return of day, noon, afternoon, evening, when the boys played in the churchyard, and I watched from a distance, being ashamed to show myself at the window lest they should know I was a prisoner . All this seems to have gone round and round for years instead of days, it is so vividly and strongly stamped on my remembrance"—("David Copperfield," Ch 4, p. 55.)

When David went as underscrub to the blacking factory, he tells the reader, "I never said to man or boy how it was I came to be there. That I suffered in secret and that I suffered exquisitely, none ever knew but I" (Ibid., Ch 11, p 151).

The misery of Oliver Twist, of the wretched victims of Mr. Squeers, and in particular of Smike who half lost his reason through ill-treatment and lack of food, all this Dickens depicts in a way which shows how well he knew the depths of childish wretchedness and the extent of childish endurance.

In both "David Copperfield" and in "Great Expectations" there are moving pictures of *fear*. There is anxiety fear · David's fear lest in biting Mr. Murdstone he might be taken into custody for committing a criminal act. Then there is his fear while he waits "to be called for" at the London coach office. He wonders what will happen if no one calls for him, will he be allowed to stay until his seven shillings are exhausted, will he starve, shall he try to walk to Yarmouth? "These thoughts and a hundred other such thoughts turned me giddy with apprehension and dismay" Then there is the fear of immediate bodily danger, such as Pip felt from the threat of the convict:

> "You fail, or you go from my words in any partickler, no matter how small it is, and your heart and your liver shall be tore out, roasted and ate." "I have often thought that few people know what secrecy there is in the young under terror I was in mortal fear of the young man who wanted my heart and my liver, I was in mortal terror of my interlocutor with the iron leg; I was in mortal terror of myself, from whom an awful promise had been extracted. . . The mist was heavier yet when I got upon the marshes, so that instead of my running at everything, everything seemed to run at me This was very disagreeable to a guilty mind. The gates and dykes and banks came bursting at me through the mist, as if they cried as plainly as could be, 'A boy with somebody else's pork pie! Stop him!' The cattle came upon me with like suddenness staring out of their eyes and streaming out of their nostrils, Holloa, young thief! . . All this time I was getting towards the river, but however fast I went I couldn't warm my feet, to which the damp

> to meet. . I had just crossed a ditch . when I saw the man sitting before me. I thought he would be the more glad if I came upon him with his breakfast in that unexpected manner, so I went forward softly and touched him on the shoulder He instantly jumped up, and it was not the same man, but another man ! And yet this man was dressed in coarse grey, too, and had a great iron on his leg. He swore an oath at me, made a hit at me and then ran into the mist, stumbling twice as he went, and I lost him ' It's the young man ! ' I thought, feeling my heart shoot as I identified him I daresay I should have felt a pain in my liver, too, if I had known where it was "—(" Great Expectations," Ch. 3, pp 11, 13.)

There is the fear of not being understood which keeps children dumb or makes them have recourse to imaginative material David when he goes to school at Canterbury is unable to talk to his schoolfellows He feels with his past history he belongs to a different world which they could not understand Pip is led to fabricate material in his inability to satisfy his sister's curiosity about Miss Haversham's " I felt convinced that if I described Miss Haversham's as my eyes had seen it, I should not be understood " Therefore Pip invents the black velvet coach, the dogs who fought for veal cutlets out of silver baskets and other marvels. Pip fears ridicule and contempt Under Estella's disdain he becomes ashamed of his hands, his boots, and when she gives him his food as if he were a dog, he is so humiliated that his eyes fill with tears."

> " The moment they sprang there, the girl looked at me with quick delight in having been the cause of them This gave me power to keep them back and to look at her "—(Ibid , Ch 10, p 51)

Fear and anger are closely associated in shame.

A child has a quick *perception of injustice* and a sharp reaction to it. Thus Pip says, " Within myself I had sustained from my babyhood a perpetual conflict with injustice I had known from the time when I could speak that my sister in her capricious and violent coercion was unjust to me " (Ibid , Ch. 8, p. 51). In the bitterness of his feelings Pip kicked the wall and took a hard twist on his hair. The five little Pardiggles had a lively sense of the injustice of Mrs Pardiggle in disposing of their pocket money in the service of her pet charities. They combined to pinch Esther Summerson and to tread on her toes as soon as they were out of the house

> " Egbert with the manner of a little footpad, demanded a shilling from me, on the ground that his pocket-money was 'boned ' from him. . What does she make a sham for, and pretend to give me money and take it away again ? I never underwent so much in body and mind in the course of a walk with young people as from those unnaturally constrained children, when they paid me the compliment of being natural "—(" Bleak House," Ch. 8, p 51.)

Esther Summerson learned what is being learned in many a children's clinic.

The phenomenon labelled "*inferiority complex*" is found in Miss Jenny Wren, though Dickens gives it no name. The crippled doll's-dressmaker feels her inferiority to other children and gives expression to this by her bitter criticism of them:

> "Don't talk to me of children I can't bear children *I* know their tricks and their manners. . . Always running about and screeching, always playing and fighting, always skip-skip-skipping on the pavement and chalking it for their games. Oh *I* know their tricks and their manners. And that's not all. Ever so often calling names through a person's keyhole, and imitating a person's back and legs."—("Our Mutual Friend," Book II, Ch 1, p 211.)

She compensates for this inferiority by dominating her father and treating him when he is drunk as a naughty child She also finds compensation in her day-dreams of a future husband. She confides to her friend how she has been thinking and wishing that she could have Lizzie with her until she is courted:

> "Because when I am courted, I shall make him do some of the things you do for me He couldn't brush my hair like you do, or help me up and down stairs like you do, and he could not do anything like you do, but he could take my work home and he could call for orders in his clumsy way. And he shall, too I'll trot him about, I can tell him "(Ibid, Book II, Ch 2, p 220.)

Her lovely mass of golden hair is a source of pride to Jenny Wren, it is another offset to her physical defects.

With three exceptions all Dickens' great novels contain important child characters. The exceptions are "Barnaby Rudge," "The Tale of Two Cities," and "The Pickwick Papers." In one sense, as was noted, Barnaby is himself a child He is simple, yet cunning, emotionally unstable and liable to panic fear "The Tale of Two Cities" is perhaps too grim a story for a child actor Yet it is not without the influence of children. Defarge and his wife witnessed the death of the baby, run over in the village street by Monsieur the Marquis's carriage It was Defarge, the wine vendor, who subsequently became the leader of the crowd, just as Madame Defarge became the leader of the women at storming of the Bastile It was she and her husband who denounced Charles Darnay, the nephew of M. the Marquis The death of the little child was just one more wrong leading to the great thirst for vengeance. At the close of the story there is another little child, Lucy, the daughter of Lucy Manette, who had married Charles Darnay. She serves to throw up the softer side of Sydney Carlton's character, and perhaps strengthened his motive in making his great sacrifice. There are two young people in "The Pickwick Papers," but they do not fill important rôles. There is the fat boy, the page at "Dingley Dell," and there is Master Bardell. Of the Fat Boy one can say that in him Dickens has described an adolescent suffering from glandular trouble, and has given a faithful picture, "*a fat red-faced boy in a state of somnolency.*"

Miss Mamie Dickens in her book, "My Father as I Recall Him," makes this statement. "We can see by the different child characters in his books what a wonderful knowledge he had of children, and what a wonderful and truly womanly sympathy he had with all their childish joys and griefs. I can remember him with us, his own children, how kind and considerate and patient he always was. We were never afraid to go to him in any trouble, and never had a snub from him or a cross word under any circumstance" (p. 14). Such was the man who stirred the imagination of his fellow countrymen and helped them to understand children.

RÉSUMÉ

DICKENS ET LA PSYCHOLOGIE DE L'ENFANT.

L'on contraste l'évaluation de l'enfance aujourd'hui avec celle de l'époque de Dickens qui a tant fait pour gagner de la sympathie pour les enfants L'on tire, des romans de Dickens, des exemples des types divers des enfants, les opprimés, les déficients, les introspectifs, l'enfant-femme L'on cite des descriptions des procédés intellectuels variés de l'enfant, surtout les souvenirs enfantins, les expériences emotives, la conscience de l'injustice.

ZUSAMMENFASSUNG.

DICKENS UND DIE KINDERPSYCHOLOGIE.

Die heutige Einschätzung der Kindheit wird der Einschätzung zur Zeit Dickens', der viel dazu beitrug, Teilnahme für die Kinder zu erwecken, gegenübergestellt Beispiele verschiedener Kindertypen aus den Romanen von Dickens werden gegeben: die Typen des Niedergeworfenen, des geistig Kranken, des Beschaulichen, der kindlichen Frau. Es werden Schilderungen verschiedener geistiger Vorgänge in der Kindheit gegeben, insbesondere das kindliche Gedächtnis, Gefühlserlebnisse, das Gewahrwerden der Ungerechtigkeit

METHODS OF FACTOR-ANALYSIS WITH AND WITHOUT SUCCESSIVE APPROXIMATION.

BY CYRIL BURT.

I.—*Rotation methods*.
II.—*Validity*.
III.—*Practicability*.
IV.—*Analysis of covariance*.

I.—ROTATION METHODS.

Problem.—The problem of factor-analysis may be stated as follows: given a series of individual measurements for a series of empirical characteristics, what are the fewest, simplest, or most discriminative factors in terms of which we can explain them? In the commoner and better-known instances the measurements represent children's performances in psychological or educational tests, and the investigator has sought to discover one 'general' factor, whose theoretical correlations with the several tests would yield the closest possible fit to the empirical correlations between the actual test-results. In such a case, the general factor, when found, is usually described as 'general intelligence'—an innate, central, cognitive capacity entering into all intellectual processes. Primarily, however, this and other factors are merely statistical components, and are not necessarily identifiable with any of the concrete mental capacities popularly recognized; rather, like latitude and longitude in geography, they are merely abstract dimensions to which we may more conveniently refer measurements in all other observable directions.

Trigonometrical Solution.—This spatial analogy at once suggests the possibility of a trigonometrical solution; and a 'new method' has recently been published by Kelley which follows this line of approach.[1] The variables are initially referred to rectangular axes representing the tests, and the analysis consists in rotating, one after another, each of these reference-axes, until they coincide with the principal axes of the frequency ellipsoid The immediate question, therefore, is how to calculate the direction-cosines that measure the angles of rotation.

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[1] The substance of what follows was originally part of a critical review of T. L. KELLEY's *Essential Traits of Mental Life* (Harvard University Press, 1935, pp. 145, $2.75). At the request of the editor, I have expanded certain alternative suggestions of my own, giving simple proofs and illustrations. My present object, therefore, will be merely to compare Kelley's 'new method' of factor analysis with those which have been put forward by other investigators and by myself and which I briefly described in a Memorandum that I was asked to prepare for the International Institute Examinations Inquiry. Accordingly, I have here suppressed the references to many other interesting and instructive features contained in Kelley's book that a fuller review would have mentioned. My original Memorandum, drawn up before the publication of Kelley's book and that of Thurstone which he criticizes, will be found, somewhat condensed, in an appendix to *Marks of Examiners* (Hartog, Rhodes, and Burt, 1936, pp. 245-314: also reprinted separately as 'The Analysis of Examination Marks: A Review of Methods of Factor Analysis in Psychology'). I shall cite this simply as *Memorandum*.

In a simple form, the student of psychology is already familiar with this mode of attacking the problem from the diagram that illustrates Yule's discussion of a correlation between two variables[1], and in a recent memorandum I have endeavoured to describe, in simple and non-technical fashion, this geometrical method of picturing more complicated cases. Most readers will doubtless recollect the general lines of solution from their schoolday struggles with it in the 'elementary treatises' on conic sections by Salmon or Smith Those acquainted with solid geometry, and with the mathematical devices used in modern physics, will be equally familiar with the generalization of the principle to more variables than two But with *n* dimensions the calculation of the direction-cosines becomes rather formidable Kelley's own explanations and his simple examples make the steps exceedingly clear In his final chapter he appends working-sheets, and detailed tables for the various trigonometrical functions required.

About the mathematics of the matter there can be little question. The research-worker, however, will inquire, first, is the 'new method' more valid than its predecessors when applied to concrete psychological data, and, secondly, is it easier to apply?

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[1] YULE, G U *Introduction to the Theory of Statistics* (1912, p 320) The idea of a 'rotation method' is by no means in itself new As was pointed out in my Memorandum, in Yule's simple example the essential principle is that "the two axes of references are rotated until they coincide with the major and minor axes of the frequency-ellipse, with the result that the product-term $(2r_{12})$ is eliminated from the equation for the ellipses and the two correlated variables are thus reduced to terms of two uncorrelated variables, whose variance is respectively a maximum and a minimum" As applied to factor-analysis the idea seems first to have been suggested by Maxwell Garnett it is implicit in Hotelling's 'method of principal axes', but Thurstone claims that 'the method of principal axes was first described' in a paper of his own in 1932 My own approach was based on the familiar principle of 'least squares' The standard methods of solution as developed in plane and solid geometry will be found, conveniently set out for non-mathematical research students, in Bowley, *Pure Mathematics* (pp. 174-79 'Ellipse Transformation of Co-ordinates by Rotation of Axes'—essentially the trigonometrical method adopted by Kelley; and pp 256-260 'Rotation of Rectangular Axes General Equation of Second Degree'—essentially the method described in my own *Memorandum* and indeed regularly given in text books on solid geometry In choosing this latter procedure I wrongly supposed that the trigonometrical method would prove impracticable in the case of *n* variables (p 289). Kelley, in his admirably lucid exposition, shows how it may be applied to such cases, though at the cost, it would seem, of considerable arithmetical labour.)

II.—VALIDITY.

Thurstone's Criticisms and Kelley's Counter-Criticisms.—The whole notion of finding principal axes has recently been criticized by Thurstone, who has proposed an alternative method of his own—a 'centre of gravity' method.[1] No doubt, were the method of principal axes put forward as the sole or final instrument for factor-analysis in psychology, Thurstone's strictures would have to be accepted. Different problems require different modes of solution; and a psychological issue can never be answered by statistics alone. The physicist can tell an engineer how to calculate the centre of mass for a revolving wheel, and how to find its moment of inertia; but which particular constant is really relevant to the engineer's particular difficulty—the first moment or the second—must be decided afresh on every occasion.

In his latest volume Kelley in his turn sharply criticizes the method advanced by Thurstone. Results obtained by it, so he declares, "have the weakness of an arithmetic average of semi-disparate things", and he concludes that "the logical foundations of the principal axes and the centre of gravity methods are irreconcilably different".

In my review of the different methods available I have endeavoured to show that, for the simpler problems of the educationist—testing the efficiency of examination marks, for instance—all the various methods put forward—those of Spearman, Hotelling, Thurstone, and the rest—may be regarded as nothing but alternative means of approximating to the same result. Is it possible, then, to reconcile Kelley's 'new method' with those of his predecessors? Kelley himself "has not undertaken an algebraic analysis of Thurstone components for three or more variables"; he leaves the main divergences to demonstrate themselves in his arithmetical illustrations. But their general character may be summed up in the following points.

Divergences between Kelley's method and Thurstone's.

(i) The first points to be decided before undertaking any form of factor-analysis are the number and the mutual relation of the factors. Kelley's method assumes (a) that the maximum number of factors will never exceed the number of tests, and (b) that the factors themselves are *statistically* independent, i.e., that their saturation coefficients are uncorrelated. Thurstone's initial postulates, on the other hand, assume (a) that, if n is the number of tests, there will be r common factors ($r<n$), n specific factors, and n error factors, i.e., $2n+r$ in all, and (b) that

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[1] THURSTONE, L. L.: *The Vectors of the Mind* (Chicago: University of Chicago Press, 1935, p. 120f.)

the saturation coefficients are *linearly* dependent only[1] These differences are, perhaps, more important for theory than for practice In practice it is impossible to extract more than *n* factors unless we have more than one set of applications for the same test, indeed, Thurstone himself rarely attempts to isolate more than three or four Actually, too, in working out his own examples, his method implicitly assumes that the correlations between the saturation coefficients will be as near zero as the conditions of the method allow The amount of divergence may be gathered from a correlation-diagram printed by Kelley for a somewhat extreme case[2] Here the two axes of the frequency ellipse, representing the two factors as deduced by Kelley's method, are seen to be at an angle of 90°, and may therefore serve as rectangular coordinates, the axes representing Thurstone's method are, so I calculate, at any angle of 75° 15′, and therefore indicate a correlation between the corresponding factors of about 26

(ii) The second question is far more troublesome Is the factor-analysis to be based on the complete matrix of observed correlations, or may the leading diagonal be omitted? The leading diagonal contains the correlations of each test with itself. If inserted, are these to be taken as unity, on the ground that the results of each test are identical with themselves? Or are we to repeat the tests twice, and use 'reliability coefficients' (coefficients of self-consistency)?

To my mind the issue is best solved by starting, not with a table of correlations, but with a table of covariances In that case the leading diagonal will contain the variances, and, incidentally, the determination of standard errors will become far more straightforward Hitherto this solution has been passed by, because most psychologists conceive themselves to be analysing correlations instead of analysing variance In my view, however, the analysis of variance is always the primary object

Thurstone, as Kelley points out, 'argues that the diagonal entries should consist of communalities,[3] not of reliability coefficients or of variances' But communalities can only be estimated, and Thurstone estimates them by taking, somewhat arbitrarily, the largest correlation in each column When using what I have called the summation method (virtually Thurstone's centre of gravity method) I have preferred to estimate them from the probable saturation coefficients by successive approximation. Spearman, who also uses a summation method, evades the difficulty by devising a formula which omits the leading diagonal altogether. Kelley himself decides to use reliability coefficients. I should have thought that the use of the variances was more in keeping with Kelley's own principles, since (as his formula shows) the reliability coefficient assumes the possible existence of $(n+1)$ factors, and he himself at the outset of his book expounds his method in terms of covariance rather than of correlation.

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[1] *Loc cit*, pp 57, 59, but cf p 80

[2] Page 51 In the artificial example discussed below the correlation is exceptionally high, but the example is itself exceptional.

[3] The 'communality' of a test may be defined as that part of the total variance of the test which is due to 'abilities common to two or more of the tests' (THURSTONE, *loc cit*, p 62)

(iii) The third difficulty is the unit of measurement for the factors. Thurstone assumes that the factors will be measured in terms of their own standard deviation, taken as unity and, therefore, as equal. Kelley, on the other hand, takes this standard deviation to be equal to the square root of the partial variance contributed by each factor to the total test-variance. The result is that Kelley's solution really consists of regression-coefficients, whereas the solution that he offers as representing Thurstone's should be regarded primarily as consisting of saturation coefficients.[1] If we allow for this difference, much of the striking discrepancy that his comparison reveals (pp. 58 and 59) will disappear.

If we express the difference in matrix notation, the two results can easily be reconciled on the following lines. Adopting Thurstone's symbols,[2] let $\mathbf{S}$ be the matrix of 'scores' (i.e., marks or test-measurements). Then, if $\mathbf{S}$ is expressed in terms of a convenient unit,[3] the matrix of observed covariances or correlations, $\mathbf{R}$, is obtained by simply 'squaring'[4] the matrix of scores, i.e., $\mathbf{R}$ is identical with the 'moment matrix' $\mathbf{S}\,\mathbf{S}'$,

$$\text{i.e.,}\quad r_{jk} = \sum_{i=1}^{i=N} s_{ji}\, s_{ki} \qquad \ldots\ldots (1)$$

Now, in my own Memorandum, it was shown that the correlation matrix, $\mathbf{R}$, can be expressed in the form $\mathbf{L}\,\mathbf{V}\,\mathbf{L}'$, where $\mathbf{L}$ is the orthogonal or semi-orthogonal matrix of direction-cosines and measures the rotations, and $\mathbf{V}$

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[1] His strongest objection to Thurstone's method is that the regression equation for determining the first or general factor measurements from the test-measurements weights all the tests equally—i.e., *g* is simply the average of the tests. I have dealt with this curious result elsewhere (*Memorandum*, p. 287). When deducing a regression equation, however, Thurstone does not employ saturation-coefficients just as they stand, but, like Spearman, applies the method of least squares.

[2] Following a common convention I shall use capital letters ($\mathbf{F}$) for rectangular matrices and small letters ($\mathbf{f}$) for vectors (one-rowed matrices)—both being in heavy type. A corresponding letter in ordinary italics (*f*) will denote an element in the corresponding matrix.

[3] If we desire to abolish differences of test-variability at the outset, the most convenient unit for matrix work is not the standard deviation, σ, but $\sigma\sqrt{N}$, where N is the number of items correlated—i.e., here persons tested (see *Memorandum*, p. 272).

[4] The term "squaring," though used by most writers on matrix-algebra, is ambiguous, unless the matrix is symmetrical, since the product-matrices $\mathbf{S}\mathbf{S}'$, $\mathbf{S}'\mathbf{S}$, $\mathbf{S}\mathbf{S}$, $\mathbf{S}'\mathbf{S}'$, are not necessarily identical.

is the diagonal matrix of contributory variances supplied by the several factors and measures the squares of the semi-axes of the ellipsoid If $\mathbf{F}$ stands for the matrix of factor loadings or saturation coefficients, then

$$\mathbf{R} = \mathbf{F}\,\mathbf{F}' = \mathbf{L}\,\mathbf{V}\,\mathbf{L}'. \qquad .. (2)$$

Assuming the factors are statistically independent, or nearly so, this equation will be satisfied by putting

$$\mathbf{F} = \mathbf{L}\,\mathbf{V}^{\frac{1}{2}} \qquad .. \;. (3)$$

The result fits Kelley's illustrations exactly, for in his main example (p 58) he gives actual figures corresponding to $\mathbf{L}$ and $\mathbf{V}$ separately, and those for $\mathbf{L}$ plainly form an orthogonal matrix. Accordingly, still keeping to Thurstone's notation, we may write $\mathbf{S} = \mathbf{F}\,\mathbf{P} = \mathbf{L}\,\mathbf{V}^{\frac{1}{2}}\mathbf{P}$, where $\mathbf{S}$, as before, is the matrix of observed scores and $\mathbf{P}$ the hypothetical factor measurements for the population. Now Thurstone requires his factor-measurements to be in standard measure, while Kelley, as we have seen, assumes that their standard deviations will be proportional to the differing lengths of the principal axes of the ellipsoid Thus Thurstone in effect analyses $\mathbf{S}$ into $(\mathbf{L}\,\mathbf{V}^{\frac{1}{2}})\,\mathbf{P}$, while Kelley analyses $\mathbf{S}$ into $\mathbf{L}\,(\mathbf{V}^{\frac{1}{2}}\mathbf{P})$.

(iv). So far the divergences are not very serious. The real point of difference lies in the mathematical method employed. Following Spearman and other earlier investigators, Thurstone obtains his saturation coefficients, $\mathbf{F}$, by a process of simple arithmetical averaging or summation, Kelley from the outset seeks a much closer fit It is true that Kelley insists that the 'logical foundations' of the two methods are 'irreconcilably different' Similarly, I suppose, we could argue that the 'logical foundations' of the methods used in calculating a standard deviation and a semi-quartile range were 'irreconcilably different'; but that does not prevent us writing $p\,e = 6745$ *s.d.*, and using one result to obtain a rough and ready estimate for the other We know so little about the true 'logical foundations' of factor-analysis that the different methods can be regarded only as different means of approximating to the same conclusion; and mathematically, I think, it can be shown that the superior accuracy of Kelley's method consists merely in carrying the approximation a stage or two further.

The Summation Method.—Let us consider the simpler formula first of all In an early investigation, published some twenty years ago,[1] I suggested that, when the more specific factors could be treated as errors, i e., as relatively small and self-neutralizing, the saturation coefficients could be determined by the equation

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[1] BURT, C: *The Distribution and Relations of Educational Abilities* (London P. S. King and Son, 1917, p 53.)

$$r_{jg} = \frac{\text{Average of coefficients in } j\text{th column}}{\sqrt{\text{Average of coefficients in the whole table}}}, \quad . . \quad (4)$$

where j stands for any test and r_{jg} (in Spearman's notation) stands for the saturation coefficient for the first or general factor (that is, f_{j1}, any one of the 'factor-loadings' in the first column of $\mathbf{F}_1$ in Thurstone's notation). The formula was deduced on the same lines as Spearman's, the only difference being that, in order to insert the self-correlations $(r_{jj}=r^2_{jg})$, the approximate saturation coefficients had to be provisionally guessed, and then corrected by some iterative device

Now, as I pointed out in my later memorandum, the term 'average' in the above formula may cover any form of averaging—for example, a geometrical as well as an arithmetical mean, or the 'averaging' may be carried out on the lines of the standard deviation by using 'second moments' as well as first; or, again, we may invoke what I loosely termed 'higher moments,' as in fitting a distribution-curve.[1] In what I called the summation formula, the arithmetic mean, depending on 'first moments' only, was taken as sufficient. Thus, in its simplest shape, the formula becomes

$$r_{jg} = \frac{t_j}{\sqrt{\Sigma t}}, \quad . . . . . . (5)$$

where t denotes the simple total of the correlation coefficients. This is the formula adopted by Thurstone, and criticized by Kelley

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[1] *Loc cit*, pp 283, 287, cf 262 The term "moments" is not, perhaps, a very helpful one in current statistics I adopt it here because it provides a useful general concept under which all the different approaches may be subsumed As past writers define it somewhat differently, a word of explanation is required. The term was originally introduced into statistical work to describe the sums of the *powers* of deviations, especially as used in fitting smoothed or graduated curves to observed frequency-distributions Thus if d be the deviation of any measurement either from the mean or from an arbitrary origin and w the frequency with which d is weighted, $\Sigma(wd^m)$ is termed the mth moment (Yule, *loc cit sup*, p 135, cf Fisher, *loc cit inf*, pp 46, 73 f) In practice the area representing the total frequency distribution $(\Sigma w=N)$ is usually taken to be unity (hence Kelley's formulæ, *Statistical Method*, p 79, like Bowley's, Thomson's and Brown's, differs at first sight from Yule's) In fitting a regression-line by the method of least squares, the sum of the *products* of deviations—commonly termed the 'product-moment'—is employed. Usually the product-moment is first calculated from the absolute values or from some convenient but arbitrary origin The product-moment correlation is then deduced by adjusting this crude product-moment for (i) difference of origin, (ii) difference of scale, and (iii) difference of number In what follows we shall be largely concerned with *unadjusted* product-moments A term is badly needed for describing this simple process in the algebra the phrases 'cross-multiplication' and 'inner products' are commonly used I am tempted to suggest the term 'co-multiplication' for the form of multiplication used with determinants and

Methods of Approximation by First and Second Moments—So long as we are dealing with examinations or with tests chosen to measure a single general factor in a small population, the results obtained by the different methods seldom differ to any very significant degree. Hence in practice the simple arithmetic mean is usually adequate, at any rate for a first approximation But in the chief example on which Kelley's criticism is based, the difference between the two results, even for the first factor, would be significant with a small population of thirty (see below, Table III) Kelley's table of observed correlations, however, is quite unlike that to which the Spearman-Thurstone methods have usually been applied. It is certainly not a case in which I myself should have used the simple summation formula without further correction

To reach a closer approximation, we may adopt any of the current devices for improving a simple average We may, for example, first weight the quantities to be averaged by taking guessed values for the final results Some kind of weighting, indeed, is essential if we go on to find a second factor by the summation method or by Thurstone's, for the residuals will be deviations about their mean, and hence will vanish if summed algebraically as they stand. To avoid this, we might either ignore the signs (as one does in calculating a mean variation), or (what amounts to much the same thing) weight the residual correlations to be averaged by such values as +1 and −1 (Thurstone's own proposal) Or we might adopt one other very obvious suggestion we might seek to abolish the signs by some method of squaring, as in calculating the second moment of a frequency-distribution (for the standard deviation or variance), or any higher moment of an even order

To determine which of these alternative methods yields the best fit, it is natural to adopt the criterion of least squares. From our proposed saturation-coefficients we reconstruct a theoretical hierarchy of test-correlations, subtract the theoretical values from the observed values, and

matrices and 'co-product' for what in current statistical language would have to be described as unadjusted and unaveraged covariance or variance

Now, if we multiply a matrix of marks by itself (duly transposed), we obtain a matrix which contains both the sums of the powers and the sums of the products, i e., both the variances and the co-variances (unaveraged and unadjusted) The resulting matrix may therefore be termed a 'moment matrix' (the phrase is used by Thurstone himself, *loc. cit inf*, p 64) If we multiply this moment matrix by itself, we obtain a new moment matrix, which may be conveniently called a moment matrix of the second order If we continue the process of self-multiplication the further matrices may be described as moment matrices of a higher order The reader will recognize many analogies in dynamics, from which the term moment is borrowed and in which similar equations are used to find, for example, the first and second moments of mass (centre of gravity and moment of inertia) The determination of 'factors' from product-moments by the method of principal axes is not unlike the determination of a 'momental ellipsoid' from the 'products of inertia,' and has closer parallels in the more recent problems of quantum-mechanics.

square and sum the discrepancies. By differentiating in the usual way, however, a 'least squares formula' for saturation-coefficients may be derived directly This gives the same result as Hotelling's method and Kelley's, but, like theirs, involves a process of iteration.[1] In deducing it, I showed that this second formula differs from the first by employing 'second moments' instead of 'first', and I went on to argue that, throughout various formulæ hitherto put forward, "the principle implicit is virtually to equate the observed coefficients and the theoretical by calculating moments",[2] that is to say, although the constants involved in the different methods differ at first sight rather widely, they differ only as the constants obtained in fitting a curve to a lower or a higher degree of accuracy differ in using lower or higher powers of the deviations The question for the practical worker, therefore, is simply this. does the superior accuracy justify the extra labour involved?

III.—PRACTICABILITY

Practical Difficulties of Methods depending on Successive Approximation.—To the ordinary research student iterative methods are exceedingly troublesome Where, as with Hotelling's procedure, he is required to start, as it were, from scratch, he may spend hours or even days before he extracts a single factor, and may even hit on a set of weights that leads to no convergence at all This brings us to the second question which Kelley's 'new method' raises. Granting its theoretical validity, is it, in actual practice, easier to apply than the somewhat elaborate devices hitherto proposed? Kelley claims that, although his results are 'identical' with Hotelling's, his method is preferable, since it converges more rapidly towards the final values.[3] He reckons, however, that, to obtain a fair approximation, $\frac{1}{2}n(n-1)$ rotations will be necessary, n being the number of tests With only a dozen tests, therefore, as many as sixty or seventy rotations will be needed. The student has only to glance at the working-sheets at the end of the book to see that this forms a lengthy undertaking

In the present article I propose to show that, by an application of familiar devices, it is possible to retain the advantage of a 'least squares' or 'second moment' fitting without the disadvantages of an iterative method. In an earlier publication I referred very briefly to these alternative devices Further trial shows that it is a simple and practicable procedure, even for the non-mathematical student, and, therefore, justifies somewhat fuller explanation. Incidentally, it will serve to demonstrate more precisely the relations between Kelley's results and those obtained by the earlier methods.

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[1] *Loc cit.*, p. 287

[2] *Loc cit*, p 287, cf p 291

[3] See, however, footnote 2, p 187, below

Correlating Correlations.—The problem is essentially one of smoothing—of 'graduation,' as it is termed. From elementary statistics every student has already learnt that a product-moment correlation yields a 'least squares fit' to the marks or measurements obtained from the correlated tests Is it not possible, therefore, that an application of the same product-moment method to the correlations themselves will yield a 'least squares fit' to the table of coefficients? The correlation of correlations is not a new device It is the basis of Spearman's 'intercolumnar criterion' for testing hierarchical order.[1] In applying this criterion, most investigators must have noticed how the new table of intercolumnar correlations approximates more closely to a hierarchy than the old The approximation is most obvious if, instead of correlating columns of correlations, we covariate columns of covariances and leave the result unadjusted (as the true criterion requires[2])—i e, if we work with the absolute values and omit to reduce the result to terms of the deviations from the mean and to multiples of the standard deviation, in short, if we work exclusively with product-moments or product-sums If we take this new table of unadjusted intercolumnar correlations in its turn and repeat the process, we approach still nearer to a hierarchy, until it becomes clear that, with a sufficient number of self-multiplications, we can reduce any *table of coefficients to as perfect a hierarchy as we wish.* If we divide by the magnified standard deviations once for all at the end, it is not difficult to show that the reduced hierarchical table will represent the *best possible fit to the original set of observed coefficients* Thus, by squaring the matrix of original scores, we smooth the regressions, and so deduce the correlations, and similarly, by squaring again, we can smooth the correlations, and so deduce the saturation coefficients.

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[1] SPEARMAN *Abilities of Man*, Appendix, pp viii, *et seq* A hierarchy may conveniently be defined as a covariance or correlation matrix of rank one—i e, matrix in which all the minor determinants of the second order vanish

[2] Adjusting the absolute product-moment so as to obtain a product-moment about the mean (though apparently always carried out by Spearman himself) spoils the test of proportionality Take Spearman's own instance (*loc cit*, second table on p ix) In arguing for the superiority of the tetrad-difference criterion *he takes two columns which are nearly but not quite hierarchical; and shows that* the intercolumnar criterion (as he applies it) is nevertheless misleadingly fulfilled But, although the *adjusted* correlation is 1·00, the *unadjusted* correlation is only ·987 The same comment applies to Thurstone's 'disproof' of the criterion (*Vectors of the Mind*, p 135) "Let the coefficients be such that, when one column is plotted against the other, a linear plot is obtained which does not pass through the origin the [intercolumnar] correlation would be +1, but the coefficients could not be proportional" Only the adjusted correlation would be +1, the unadjusted would not

This may be most easily demonstrated by a mathematical analysis of the procedure To begin with, let us assume with Spearman that each observed correlation between two tests or traits, r_{12} say, is the product of the saturation coefficients for those tests (i e , of their hypothetical correlations with the general factor *g*) plus a relatively small error due to specific factors (including chance) The process of smoothing will further assume that the errors are practically uncorrelated and that their sum is approximately zero Thus, we may write $r_{12}=r_{1g}r_{2g}+e_{12}$, and so on. The first two columns in our initial table of observed correlations, therefore, will in theory be composed as shown in the first two columns of the middle panel of the table below (Table I—taking three tests only for simplicity)

TABLE I

Sat Coeffs	r_{1g}	r_{2g}	*Intercolumnar Product-Moment*
	Observed Correlations		*Products of Correlations*
r_{1g}	$r^2_{1g}+e_{11}$	$r_{1g}r_{2g}+e_{12}$	$r^2_{1g}\,r_{1g}r_{2g}+e_{11}r_{1g}r_{2g}+e_{12}r^2_{1g}+e_{11}e_{12}$
r_{2g}	$r_{2g}r_{1g}+e_{21}$	$r^2_{2g}+e_{22}$	$r^2_{2g}\,r_{1g}r_{2g}+e_{21}r^2_{2g}+e_{22}r_{2g}r_{1g}+e_{21}e_{22}$
r_{3g}	$r_{3g}r_{1g}+e_{31}$	$r_{3g}r_{2g}+e_{32}$.	$r^2_{3g}\,r_{1g}r_{2g}+e_{31}r_{3g}r_{2g}+e_{32}r_{3g}r_{1g}+e_{31}e_{32}$
. .	.	. . .	. . ..
	Product-Sum		$(r^2_{1g}+r^2_{2g}+r^2_{3g})\,r_{1g}r_{2g}+\Sigma e_1+\Sigma e_2+\Sigma e_{h1}e_{h2}$

Now if, adopting the usual summation formula for finding r_{1g}, we merely add its first column, we assume that $(e_{11}+e_{21}+e_{31})=0$ Unless the number of tests is large, this assumption is not likely to be fulfilled If, however, we correlate the columns, the errors will be considerably reduced by multiplication before they are summed On correlating the two columns in the table above we first obtain a product-sum as shown at the foot of the last column Since all the quantities by which the errors are multiplied are fractional, the total $\Sigma e_1+\Sigma e_2+\Sigma e_{1h}\,\Sigma e_{2h}$ is much more likely to approximate to zero than the simple sum $(e_{11}+e_{21}+e_{31})$ Let us write $\Sigma(\pi_{12})$ for the sum of the products of the first two columns, and similarly for the other pairs of columns. We then have, for the intercolumnar correlation (unadjusted),

$$R_{12} = \frac{\Sigma(\pi_{12})}{\Sigma(\pi_{11})\,\Sigma(\pi_{22})}$$

$$= \frac{r_{1g}\,r_{2g}\,(r^2_{1g}+r^2_{2g}+r^2_{3g})}{\sqrt{r^2_{1g}\,(r^2_{1g}+r^2_{2g}+r^2_{3g})}\;\sqrt{r^2_{2g}\,(r^2_{1g}+r^2_{2g}+r^2_{3g})}} \pm E'_{12} = 1.00 \pm E'_{12} \qquad \text{. . . . . (6)}$$

To obtain the smoothed coefficients for the initial table, r'_{12} say, we must divide $\Sigma(\pi_{12})$ by the square root of the variance thus produced, i.e.,

$$r'_{12} = \frac{\Sigma(\pi_{12})}{\sqrt{\Sigma(\pi_{11})+\Sigma(\pi_{22})+\Sigma(\pi_{33})}}$$

$$= \frac{r_{1g}\,r_{2g}\,(r^2_{1g}+r^2_{2g}+r^2_{3g})}{(r^2_{1g}+r^2_{2g}+r^2_{3g})} \pm e'_{12}$$

Here e'_{12} will be much smaller than e_{12} (The non-mathematical reader will follow the argument more easily if he works out a simple example, substituting easy quantities, such as 1, 2 for r_{1g}, r_{2g}, adding, if he likes, for the errors, smaller positive and negative quantities such as ± 001 at random to the products)

If, in the new table thus formed, the quantities e'_{jk} are not all negligible, the process of intercolumnar covariation may be repeated The new errors e''_{jk} (say) will be smaller still And the procedure can be repeated again and again until the final table passes all the criteria for hierarchical formation . e g , until all such intercolumnar correlations as R'''_{jk} (say) =1 000 . (to as many decimal places as the original figures or their probable errors will warrant)

The saturation coefficients will be found by simply taking the square root of the new coefficients in the diagonal · e g , if we use the first set of intercolumnar product-moments,

$$\begin{aligned} r_{1g} &= \sqrt{r'_{11}} = \frac{\sqrt{\Sigma r^2_{jk}}}{\sqrt[4]{\Sigma r^2_{jk}}} \\ &= \sqrt{r^2_{1g} + e'_{11}} \\ &= r_{1g} \text{ approx} \qquad \ldots \ldots (8) \end{aligned}$$

Or, generally,

$$r_{jg} = \frac{\text{square root of sum of squares of all coeffs in } j\text{th column}}{\text{fourth root of sum of squares of all coeffs in table}} \qquad \ldots \ldots (9)$$

This brings out more clearly the point made in my memorandum. The original summation formula for r_{jg} is analogous to the process of calculating an arithmetic mean by taking first moments , the new formula is analogous to calculating a root-mean-square deviation by taking second moments , and for greater accuracy the process may be continued, taking what may loosely be called moments of a higher order

Worked Example.—Let us illustrate and test this method by applying it to Kelley's own example. His initial table of observed covariances or correlations[1] is as follows (*loc cit* , p 58) ·

TABLE II

OBSERVED CORRELATIONS

Test	(*i*)	(*ii*)	(*iii*)
(*i*)	1 00	70	26
(*ii*)	·70	75	·45
(*iii*)	26	·45	35

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[1] His example is fictitious, so that the coefficients are not actually ' observed ' values Moreover, in order to obtain a closer comparison with Thurstone's method, Kelley has explicitly substituted ' communalities ' for the full variances (self-covariances) in the diagonal In his second example (which is ' not solved out by [his] rotation method ') he puts the diagonal variances equal to 1 00, so that the covariances are throughout identified with the correlations

(i) *First Moments* (*Summation Method*).—The saturation coefficients obtained by the ordinary summation method (equation 5, above) have been calculated by Kelley himself. I give them in the first line of Table III. The figures which Kelley obtains by his own method and prints for comparison are, it will be remembered, regression coefficients, not saturation coefficients. The saturation coefficients, however, can at once be deduced from his figure for the variance of the first factor; they are inserted in the last line of the table

There can be no question that Kelley's figures give the better fit If we test them by the method suggested in my memorandum—calculating a theoretical hierarchy from the saturation coefficients and comparing it with the table of observed coefficients by averaging the squares of the errors (last column of Table III)—we find that Kelley's figures give an average improvement of over 8 per cent The theoretical value of r_{11} as calculated by the summation method diverges from the observed value by ·22, there is no error that approaches this magnitude with any of the following methods To this extent Kelley's criticisms of Thurstone are certainly justified

TABLE III

SATURATION COEFFICIENTS FOR FIRST OR GENERAL FACTOR

Method	*Test* (*i*).	*Test* (*ii*)	*Test* (*iii*)	*Mean Square Error*
First Moments (Summation Method)	88364	·85659	47789	·01394
Second Moments (Intercolumnar Method)	·93271	83725	·46829	·01319
Higher Moments (Least Squares Method).	·92677	83999	43967	01280
Kelley (Rotation Method) .	92719	·83982	·43916	01281

(ii) *Second Moments* (*Intercolumnar Method*).—Let us now start to correlate the correlations, or, rather, to covariate the covariances, leaving the product-sums as before unadjusted The saturation coefficients given by formula (9) are set out in the second line of Table III. Except for the last coefficient these agree with Kelley's figure to the first two decimal places. Testing the result as before, we find that the square of the errors is reduced by nearly 6 per cent.

(iii) *Higher Moments.*—If we employ moment-matrices of a higher order we obtain a closer approximation still Taking Kelley's table of correlations, let us multiply, multiply, and multiply again After the third self-multiplication of the correlation matrix we reach $\mathbf{R}^8=$

$$\begin{matrix} 44\,541 & 40\,372 & 21\,131 \\ 40\,372 & 36\,593 & 19\,153 \\ 21\,131 & 19\,153 & 10\,025 \end{matrix}$$

The variance due to the first or general factor may be determined from the sum of the three figures in the diagonal, viz ,

$$91\cdot159=v^8{}_1$$

From this we find $v_1=1\cdot7578$ (identical with Kelley's figure) and $v^7{}_1=51\cdot859.$

Dividing the figures in $\mathbf{R}^8$ by $v^7{}_1$, we obtain figures of the initial order of magnitude with which we set out (Table IV)

TABLE IV

HIERARCHY FOR FIRST FACTOR

(Table II smoothed by Repeated Intercolumnar Correlation)

Test	(*i*)	(*ii*)	(*iii*)
(*i*)	·85890	77850	40748
(*ii*)	77850	70558	·36933
(*iii*)	40748	36933	19331

It is evident that this is an almost perfect hierarchy Let us test it by the usual criteria (i) Dividing by the appropriate standard deviations we find that the intercolumnar correlations are almost exactly unity, e.g.,

$$\frac{\cdot77850}{\sqrt{\cdot85892\times\ 70558}}=1\cdot00002$$

Or, if with Thurstone[1] we prefer (ii) the ' intercolumnar proportionality criterion ' to the ' intercolumnar correlation criterion,' we find that the ratio of the figures in the first row to those beneath them in the second row ($\frac{\cdot 85892}{\cdot 77851}$, etc.) is 1 1033 throughout, and of the figures in the second row to those beneath them in the third ($\frac{\cdot 77851}{\cdot 40748}$, etc.) 1 9105 throughout.

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[1] *Loc cit* The proportionality criterion was first given in my article on ' Experimental Tests of Intelligence,' *Brit Journ Psych*, III, 1909, p 159 As I there indicated, however, it is immediately deducible from equation (f) as given by Spearman and Krüger in *Zeitschr f Psych*, XLIV, p 85

It follows that, if we apply (iii) the tetrad difference criterion, we shall find that the second order minors are all approximately zero, e.g.,

$$\cdot 77850 \times 36933 - 70558 \times 40748 = \cdot 00001 \ldots$$

It remains to inquire whether this resultant hierarchy really fits the values observed. Judged by the mean square error, the discrepancies are certainly smaller than any we have yet obtained. They are slightly smaller even than those obtained from Kelley's own method.

Since, then, the hierarchy is practically perfect, we can now determine the saturation coefficients either by the summation-formula, or, more simply, by taking the square roots of the figures in the diagonals The coefficients are given in the third line of Table III On directly calculating the saturation coefficients by what I termed the 'least squares formula' I get identical figures, at any rate so far as the five significant digits are concerned

Formal Proof—I have, I hope, now sufficiently demonstrated to the non-mathematical reader the working procedure, and its simplicity and soundness A brief general proof can easily be deduced by matrix algebra

(i) Let us write $\mathbf{f}_1$ for the first column of the factorial matrix $\mathbf{F}$, i e., for the vector consisting of the saturation coefficients for g, viz, $r_{g1}, r_{g2}, \ldots r_{gn}$ Then, if $\mathbf{R}$ were a perfect hierarchy ($\mathbf{H}$ say), i e, if the other columns of $\mathbf{F}$ were zero, we could obtain the saturation-coefficients from Spearman's well-known equation, which can now be written in matrix form,

$$\mathbf{H}_1 = \mathbf{f}_1 \mathbf{f}'_1 \qquad \ldots\ldots\ldots\ldots \quad (10)$$

But, with most tables of observed correlations, $\mathbf{R}$ is not a perfect hierarchy, and the other columns of $\mathbf{F}$ are not zero

We may, however, as shown in my Memorandum[1], take

$$\mathbf{R} = \mathbf{L}\mathbf{V}^{\frac{1}{2}}\ \mathbf{V}^{\frac{1}{2}}\mathbf{L}' = \mathbf{F}\,\mathbf{F}'$$
$$\mathbf{V} = \mathbf{V}^{\frac{1}{2}}\mathbf{L}'\ \mathbf{L}\mathbf{V}^{\frac{1}{2}} = \mathbf{F}'\,\mathbf{F}$$

and hence

$$\mathbf{R}^2 = \mathbf{F}\,\mathbf{F}'\,\mathbf{F}\,\mathbf{F}' = \mathbf{F}\,\mathbf{V}\,\mathbf{F}'$$

and generally

$$\mathbf{R}^m = \mathbf{F}\,\mathbf{F}' \ .\quad \mathbf{F}\,\mathbf{F}' = \mathbf{F}\,\mathbf{V}^{m-1}\,\mathbf{F}' \qquad \ldots\ldots\ldots\ldots \quad (11)$$

---

[1] pp 290, *et seq* I have altered the symbols to conform, so far as possible, with those of Thurstone

Now, $\mathbf{V}^{m-1}$, like $\mathbf{V}$, will be a diagonal matrix, and will contain the separate variances raised to the $(m-1)$th power But by definition the first or general factor is that which contributes most to the total variance, and the remainder may be defined similarly · that is, $v_1 > v_2 > \; . \quad . > v_n$. Accordingly, if we take m large enough, $v_2^{m-1} \qquad v_n^{m-1}$ will, as a rule[1], become negligible as compared with v_1^{m-1} Consequently, in multiplying $\mathbf{F}'$ by v^{m-1} we render all the rows of $\mathbf{F}'$ negligible except the first, i e , the vector $\mathbf{f}_1$ Thus equation (11) reduces to

$$\mathbf{R}^m = v_1^{m-1}\mathbf{f}_1\mathbf{f}'_1,$$

$$\text{i e , } \frac{1}{v_1^{m-1}}\mathbf{R}^m = \mathbf{f}_1\mathbf{f}'_1 = \mathbf{H}_1 \qquad \ldots\ldots\ldots \ldots . (12)$$

(ii) To check the results, and to see whether any further approximation is required, we may combine this procedure with an explicit weighting such as that suggested above. We shall now in effect be taking uneven moments of $\mathbf{S}$. The assumption made by Spearman and Thurstone is that the contributions of each specific factor should add up to zero , the principle of the present method is that the sum of these contributions will only vanish when each of them has been appropriately weighted first of all[2] Since by hypothesis the factors are independent, the correlations between their respective saturation coefficients should be extremely small, if not actually zero. Hence if we use the saturation coefficients of the first factor to weight the contributions of the others, then the weighted sum must tend to vanish We have, in short, $\mathbf{F}' \mathbf{R}^m = \mathbf{V}^{\frac{1}{2}} \mathbf{L}' \mathbf{L} \mathbf{V}^m \mathbf{L}' = \mathbf{V}^m \mathbf{F}'$ If the weights f_{j1} have been correctly computed or correctly guessed, such sums as $\Sigma(f_{j1} f_{1k})$ will reduce practically to zero; if incorrectly, then as before v_1^m, v_2^m, etc, will give such sums a very low weight. We can thus check or correct the saturation coefficients (**F**) by the following formula (directly deducible from Table I, and in effect simply a modification of equation 4 to allow for weighting).

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[1] The test is (i) $v_1 > 1{\cdot}00$, (ii) $v_1 > v_2 + v_3 + \quad + v_n$ This implies a double condition nearly always borne out in practice, viz , that the variance contributed by the first or general factor must be (i) greater than unity, and (ii)—what is far more essential—more than half the total variance. If two or three decimal places alone are required in the solution, only two or three matrix-multiplications will in general be required. Here, with Kelley, I have kept five significant figures, in order to make a fairly complete comparison If unity is substituted throughout for the self-correlations (reliability coefficients '), the number of matrix-multiplications is considerably increased See below, p 191

[2] This weighting principle is the essence of Hotelling's iterative method of factor-analysis (*Journ Educ Psych* , XXIV, p 429) I find, however, that very few students of education or psychology are able to follow Hotelling's proof or to apply his method as it stands Possibly the alternative explanation in the text may make the procedure more intelligible , it certainly leads to briefer calculations.

In the first number of the new journal *Psychometrika* (pp 26, *et seq*) Hotelling has recently described a modification of his method which depends in part on the same principle as that explained in the text—though the principle has been differently arrived at and is differently used His new procedure is still essentially an iterative method It consists in applying the old process of successive approximation to the multiplied matrix. Thus, in his worked example, he requires eight iterations to obtain values satisfactory to 5 decimal places There has not yet been time for me to ascertain whether the ordinary student of educational psychology will find this easier than Hotelling's original method, but it certainly seems more laborious than the procedure described in the text The advantage of my method is that the mathematical work consists simply of mechanical arithmetic throughout Hotelling's method assumes that the student has some flair for hitting on the most likely trial-values The ordinary research-student may have to make a dozen shots for every one single iteration made by a more experienced worker The advantage of Hotelling's method, and still more of Kelley's, is that they are applicable to those rarer cases referred to above in which the factor-variances are nearly equal Hotelling himself believes it "possible that Kelley's method is more suitable when all the characteristic roots are desired but not the corresponding correlations of the variates with the components "

$$\frac{\text{Weighted sum of column}}{\text{Sum of all weighted sums}} \times \text{Sum of (trial) coefficients} \quad \ldots\ldots(13)$$

As noted in my memorandum, there is no need to reduce the weighted sums to ratios, and then square, add, find square root, and multiply, as Hotelling's procedure demands. On applying this method to the saturation coefficients just obtained, I reach the same figures as before: further approximation is therefore unnecessary Let us apply the same test to Kelley's figures Taking $m = 1$, i.e., using the original correlation matrix **R** as it stands, and then *weighting* the coefficients before finding their sum, we have

TABLE V

SUCCESSIVE APPROXIMATION AS A CHECK

Test	*Sat. Coeffs Kelley's Values*	*Test (i)*		*Test (ii)*		*Test (iii)*		*Total*
		Coeff	*Prod*	*Coeff*	*Prod*	*Coeff*	*Prod*	
(i)	92719	1·00	92719	70	·64903	26	24107	1 62924
(ii)	83932	·70	·58787	·75	·62987	45	37792	1·47652
(iii)	43916	26	11418	·45	19762	35	15371	·77270
Total	2 20617		1 62924		1·47652		·77270	8 87846
Sat Coeffs (2nd approx)			·92675		83988		43953	

The ratio of the first and last totals is $\frac{2 \cdot 20617}{3 \cdot 87846} = \cdot 568826$ Multiplying the totals of the products by this ratio, we obtain, as a second approximation, the figures shown in the last line These are not quite the same as the trial values which Kelley has given us as final Actually they are beginning to approach the figures obtained by my own method (Table III, third line) Kelley's figures therefore seem to require further approximations, if we are to aim at the greatest amount of accuracy procurable with five decimal figures

It appears, then, that, as we keep correlating, the sums of the product moments approximate more and more closely towards the proportionate values of the saturation coefficients Thurstone takes merely the sums of the first set of product moments, hence his method may be regarded as the simplest application of the general principle, and his results as a first approximation The values obtained by Kelley and myself are those reached by carrying the same principle several stages further With this interpretation, Kelley's criticisms of the older technique can be safely met, and the 'irreconcilable differences' disappear At the same time, it will be seen, the new method takes far less time to apply than the process of 'successive rotations.'

Factors other than the First—Kelley, however, claims it as a special advantage of his method that the saturation coefficients for *all* the factors—not the first or general factor only—are simultaneously obtained. With Hotelling's and other iterative methods, as he points out, the whole process of successive approximation has to be repeated afresh for each factor How far does his objection hold good of the alternative procedure I have just described?

Before we can answer this question, there is a preliminary question which we must decide Having eliminated g, what further factors are we to seek? Most investigators postulate that the factors shall be 'independent', but they do not always define what is meant by independence. Here I shall assume that the next factor is that which yields the next greatest amount of discrimination, or, in other words, furnishes the closest fit to the residual correlations. This definition is equivalent to defining independence as *statistical* independence, and, therefore, to the requirement that the correlation between the two sets of saturation coefficients shall be zero exactly, i.e., $\Sigma\,(r_{hg}\,r_{hs})=0$ This in turn implies, in vector notation, that the vector-products $\mathbf{f}_g\mathbf{f}_s$ and generally $\mathbf{f}_i\mathbf{f}_j$ all vanish when $i \neq j$

With this assumption we may write

$$\begin{aligned} \mathbf{R} &= \mathbf{H}_1+\mathbf{H}_2+ \quad +\mathbf{H}_n \\ &= \mathbf{f}_1\mathbf{f}_1{}'+\mathbf{f}_2\mathbf{f}_2{}'+ \quad +\mathbf{f}_n\mathbf{f}'_n \qquad \ldots\ldots, \quad (14) \end{aligned}$$

Since $\mathbf{H}_i\mathbf{H}_j=0$ $(i \neq j)$ we have

$$\begin{aligned} \mathbf{R}^m &= \mathbf{H}_1{}^m+\mathbf{H}_2{}^m+\ldots+\mathbf{H}_n{}^m \\ &= \mathbf{H}_1{}^m+\mathbf{R}_{-1}{}^m \qquad \ldots\ldots\ldots \quad (15) \end{aligned}$$

where $\mathbf{R}_{-1}$ denotes the table of residual correlations obtained after eliminating the influence of the first factor.

Again, for any given factor j,

$$\begin{aligned} \mathbf{H}_j{}^m &= (\mathbf{f}_j\,\mathbf{f}'_j)^m \\ &= \mathbf{f}_j\,(\mathbf{f}'_j\,\mathbf{f}_j)^{m-1}\,\mathbf{f}'_j \\ &= v_j{}^{m-1}\,\mathbf{H}_j \qquad \ldots\ldots \quad (16) \end{aligned}$$

Thus $\mathbf{H}_2$ (say) can be determined from the residual correlations $\mathbf{R}_{-1}$ on the same lines as before, provided that $\mathbf{R}_{-1}$ is not negligible and $\mathbf{R}_{-2}$ is In determining $\mathbf{H}_1$, we have in effect assumed that m is so large that $\mathbf{R}_{-1}^m$ is negligible. To determine $\mathbf{H}_2$, m must not be so large as before. Thus there will be no need for fresh multiplication of moment matrices, and no need[1] for successive approximation.

Let us test this on Kelley's example. We may take $\mathbf{R}^2$ as our starting point This has already been calculated in determining $\mathbf{R}^4$ We eliminate f_1 in the usual way, namely, by subtracting the hierarchy (raised to the same order) produced by g Since $\mathbf{H}_1^2 = v_1\mathbf{H}_1$, we have

$$\mathbf{H}_2 = \frac{1}{v_2}(\mathbf{R}^2 - v_1\mathbf{H}_1) \qquad \ldots\ldots\ldots\ldots(17)$$

From $\mathbf{H}_2$ the saturation coefficients may be obtained as before—e.g , by the summation method or from the square-roots of the self-correlations.

Taking Kelley's correlations once again I give below the saturation coefficients as calculated by this method, and for comparison those calculated by Kelley both with his own procedure and with Thurstone's

TABLE VI

SATURATION COEFFICIENTS FOR SECOND FACTOR

Method	*Test (i)*	*Test (ii)*	*Test (iii)*
Summation Method (Thurstone) .	46817	—·12156	— 34662
Higher Moments (Burt)	·36907	— 20482	— 38648
Rotation (Kelley)	·36864	—·20425	— 38772

Considering that we are no longer starting with precisely the same residual correlations, the agreement between Kelley's results and my own is sufficiently close. The figures representing Thurstone's method show an appreciable correlation between the saturation coefficients for the second factor and those for the first This is not necessarily an argument in favour of Kelley Although Kelley explicitly postulates that each set of saturation coefficients shall be uncorrelated with the others, his artificial table was constructed from two general factors (amongst others) whose saturation-coefficients *are* correlated. This is because he deliberately chose an instance where, following Thurstone, known communalities could be inserted in the leading diagonal My conclusion is that Thurstone's method may be better suited to cases where we know that his postulates, rather than Kelley's, are applicable.

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[1] With a similar reservation as before, namely, that v_2 is considerably larger than $v_3 + \quad + v_n$.

Were we ignorant of the nature of this second factor, we should be less likely to accept the results of Thurstone's method. Those who believe in the supreme importance of the general factor would be tempted to say that his procedure attributes to the second factor a good deal of the variance (that arising out of the first test, more particularly) which should have been attributed to the first factor A more serious objection is that with this method the saturation coefficients for all factors after the first necessarily add up to a total of zero—i e, they are treated as errors which vary equally on either side of the average dictated by the first factor—a very arbitrary postulate Even with Kelley's method and my own, these subsequent factors are bipolar factors—i.e., are bound to have negative saturation coefficients—a peculiarity that usually puts them on a different footing from the first

IV —THE ANALYSIS OF COVARIANCE.

Covariance or Correlation —Kelley's second example is taken from an actual experiment—tests of speed and 'power'[1] of reading and arithmetic. Here most teachers would expect the specific factors to be bipolar—literary versus non-literary ability, speed with a sacrifice of accuracy versus the tendency to be slow but sure This expectation is confirmed by both modes of factor-analysis And here, too, Thurstone's saturation coefficients show very little more correlation than Kelley's, on the other hand, they have, as Kelley points out, a far more artificial look, being often identical, except for sign, to five places

We may begin by considering whether the method I have myself suggested is applicable to this table as it stands. At first sight nothing could be less like a hierarchy there is evidently a large group-factor for reading, and another for arithmetic, further, Kelley's insertion of unity for all the consistency coefficients in the leading diagonal makes the table very different from those that have generally been used for purposes of factor-analysis But even here six self-multiplications suffice to transform the table into what is an almost perfect hierarchy. I give the saturation coefficients so obtained (Table VII). They agree, except in the third decimal place, with those accepted by Kelley.

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[1] Roughly speaking, what Kelley terms 'power' means, in the tests of reading, the power to grasp meaning and reproduce it accurately, and, in the tests of arithmetic, the power to understand a problem and work it out correctly

Strangely enough Kelley does not apply his own rotation method to this example Hotelling had already chosen it to illustrate his method,[1] and Kelley is content to reprint Hotelling's figures alleging that they will be 'equivalent' to his own. Now Kelley's proof is expressed in terms of covariances, not of correlations. This, indeed, is one of the most welcome features of his discussion It brings his whole approach more into line with the recent methods of statistical analysis that have been advocated in this country It is, therefore, a little surprising that, when he comes to arithmetical examples, what he actually analyses are always coefficients of correlation. The reason is clear At the very outset of his book he states that, although "the procedure followed is new ., the outcome is identical with that given by Hotelling's" Now, it is not difficult to show that, if Kelley's procedure is applied to *covariances*, the outcome will *not* in general be identical with that given by Hotelling's method, since Hotelling always starts with coefficients of correlation.

From Kelley's earlier volume we can reconstruct the table of covariances for his own example.[2] From these I have calculated the factor loadings and thence the corresponding saturation-coefficients I print them, with the saturation coefficients obtained by the different methods direct from the table of correlations.

TABLE VII

SATURATION COEFFICIENTS OBTAINED FROM COVARIANCES AND FROM CORRELATIONS

Basis	*Reading*		*Arithmetic*	
	Speed	*Power*	*Speed*	*Power*
	Test (i)	*Test* (ii)	*Test* (iii)	*Test* (iv)
Covariances	770	706	674	·411
Correlations.				
Hotelling	816	·693	·606	576
Burt	·814	·689	610	·580
Thurstone	·754	638	·663	652

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[1] *Journ Educ Psych*, XXIV, p 433 On p 434 Hotelling gives figures also differing in the third decimal place These latter are printed by Kelley in the table I give Hotelling's first set On checking my own figures by multiplying them with the rows of the original matrix and deducing a second approximation by Hotelling's method, I obtain figures identical with the "trial-values" to five decimal places On testing Hotelling's figures in the same way the second approximations differ in the third decimal place and tend towards those given above

[2] *Cross Roads in the Mind of Man*, p 100 · Table X gives both the standard deviations and the observed correlations: (in applying factor analysis Kelley and Hotelling take correlations corrected for reliability)

It will be seen that the figures obtained from the covariances diverge appreciably from those obtained from the correlations. But the comparison is somewhat complicated by the fact that the correlations used by Hotelling and Kelley are corrected for unreliability If, however, the reader takes a simple fictitious table of covariances and standard deviations, deduces the correlations, and applies factor-analysis to both matrices, he will easily convince himself that the results seldom agree.

A general proof may be appended on the lines indicated in my *Memorandum*[1] Reducing a matrix of marks or scores ($\mathbf{S}$) to standard measure means pre-multiplying it by a diagonal or semi-scalar matrix, $\mathbf{D}$ say, containing the reciprocals of the standard deviations (or more conveniently of $\sigma\sqrt{N}$) in its leading diagonal and zero elsewhere Then, if $\mathbf{R}_1$ denote the matrix of covariances and $\mathbf{R}_2$ the matrix of correlations, $\mathbf{R}_1 = \mathbf{S}\,\mathbf{S}'$ and $\mathbf{R}_2 = \mathbf{D}\,\mathbf{S}\mathbf{S}'\,\mathbf{D}' = \mathbf{D}\,\mathbf{R}_1\,\mathbf{D}'$. Now the contributory variances which determine the factors are calculated by finding the latent roots of $\mathbf{R}_1$ and $\mathbf{R}_2$, i e, the roots obtained by solving the determinantal equations $|\mathbf{R}_1 - \lambda\mathbf{I}| = 0$, $|\mathbf{R}_2 - \lambda\mathbf{I}| = 0$ Under what conditions[2] are the roots of these equations identical? We must have $|\mathbf{R}_2 - \lambda\mathbf{I}| = |\mathbf{D}|\ |\mathbf{R}_1 - \lambda\mathbf{I}|\ |\mathbf{D}|^{-1}$, i e, $\mathbf{R}_2 = \mathbf{D}\,\mathbf{R}_1\,\mathbf{D}^{-1}$ and $\mathbf{D}\,\mathbf{D}' = \mathbf{D}\,\mathbf{D}^{-1}$ If $\mathbf{D}$ is a diagonal matrix, and $\mathbf{D}'$ its transpose, this requirement can only be satisfied if $\mathbf{D}$ is reducible to a unit matrix Accordingly, for the two sets of factor-variances to be the same, when obtained from factorizing correlations and from factorizing covariances, the standard deviations of the original measurements must all be equal

Since the results are different, which procedure are we to follow—that suggested by Kelley's algebraic proof or that suggested by his arithmetic examples? The answer will turn on the nature of the problem. For most purposes, as I have already indicated,[3] I believe the right method is to factorize covariances (or product-sums) rather than coefficients of correlation. To begin with, the student will avoid a good deal of unnecessary labour—dividing by the standard deviations and by the numbers in the groups, and then working with troublesome decimals But there are stronger reasons than this. First of all, Kelley's primary purpose is to calculate regression equations for the several factors (general intelligence, literary capacity, and the like, as we have called them). Now regression-equations are more likely to be accurate if they are based directly on a factorization of covariances rather than on the factorization of correlations[4] Secondly, for most investigations (par-

[1] *Loc cit*, pp. 272, 290

[2] Cf. Bôcher, *Higher Algebra*, pp 299 f.

[3] *Loc cit*, p 247

[4] This is borne out, or at any rate clearly illustrated, by the factor-loadings for his own data In calculating a child's general intelligence from Kelley's four tests, the factor-loadings derived from an analysis of covariance give far more weight to the 'power' of reading—i e, intelligent reading as distinct from mere speed of reading, and far less weight to the relatively unreliable test for 'power' of arithmetic That, I imagine, is a result which the practical teacher would readily accept

ticularly such investigations as Kelley has in mind in the later part of his volume—namely, researches on psychological groups or 'types') it is desirable that, whether we start by correlating persons or traits, the results of factorizing one and the same initial matrix should lead to the same set of factors. Now, in general, if the standard deviations for the tests are equal, those for persons will not be. Hence it seems desirable throughout to work in terms of covariance. And generally, it would seem, the statistical problems in individual psychology can best be solved if we think of them as problems in the analysis of variance rather than as problems in the analysis of correlations

RÉSUMÉ

DES MÉTHODES DE L'ANALYSE DES FACTEURS AVEC ET SANS APPROXIMATION SUCCESSIVE

Le but de cet article est de comparer la " méthode nouvelle " de l'analyse des facteurs décrite par Kelley avec les méthodes antérieures que j'ai décrites dans un mémoire que j'ai déjà redigé pour " L'Enquête sur les Examens de l'Institut International " Kelley pose le problème d'une façon analogue, mais suggère une solution trigonométrique Il décrit sa méthode comme équivalant celle de Hotelling ; mais l'on démontre ici que si, comme Kelley lui-même l'exige, son analyse est appliquée aux covariances, elle mène à un résultat différent De l'autre côté Kelley prétend que sa méthode diffère irréconciliablement de celle de Thurstone. Dans le mémoire antérieur j'ai démontré que la méthode de Thurstone et celle de Hotelling ne différaient qu'en tant qu'elles représentaient des approximations basées respectivement sur le premier et le second moment. Ici on peut tirer la même conclusion pour la nouvelle méthode de Kelley. Dans cet article j'ai décrit avec plus de détail une méthode de l'analyse des facteurs, basée sur des moments supérieurs, qui, tout en menant aux même résultat que celles de Kelley et de Hotelling; se passe du procédé pénible de l'approximation successive.

ZUSAMMENFASSUNG.

METHODEN DER FAKTORENANALYSE MIT UND OHNE UNUNTERBROCHENE ANNAHERUNG

Dieser Artikel bezweckt einen Vergleich zwischen der von Kelley geschilderten " neuen Methode " der Faktorenanalyse und den früheren Methoden, die ich in einem vorhergehenden Memorandum geschildert habe, das für die International Institute Examinations Inquiry aufgestellt wurde. Kelley legt das Problem in fast derselben Weise dar, aber er deutet eine trigonometrische Lösung an. Er

erklärt, dass seine Methode und die Hotellings gleichwertig seien, aber es wird hier gezeigt, dass wenn, wie Kelley selbst verlangt, seine Analyse auf Kovarianzen angewandt wird, sie zu einem anderen Ergebnis führt. Dagegen behauptet Kelley, dass seine Methode mit der Thurstones absolut unvereinbar sei Im vorhergehenden Memorandum wies ich daraufhin, dass die Methoden von Thurstone und Hotelling sich nur dadurch unterscheiden, dass sie Annäherungen auf der Basis erster und zweiter Momente sind Hier bestätigt sich dasselbe für die neue Methode von Kelley. In diesem Artikel habe ich eingehender eine Methode der Faktorenanalyse auf der Basis höherer Momente geschildert die zu demselben Ergebnis führt wie Kelleys und Hotellings Methoden Sie entbehrt aber des mühseligen Verfahrens der sukzessiven Annäherung.

COMPARISON OF INDIVIDUAL-CONCRETE METHODS AND CLASS METHODS IN THE TEACHING OF ARITHMETIC.*

By MARGARET D. K. MORFITT,
(*From the Department of Psychology, Glasgow University*).

I.—*The aim of the investigation.*
II.—*Schools in which the tests were applied*
III.—*Test I · "Spot Test"*
IV.—*Test II · "Multiplication Test."*
V.—*Sex differences.*
VI.—*Summary.*

I.—THE AIM OF THE INVESTIGATION.

(*a*) To examine, by means of introspections, the methods used by children to estimate the number of concrete objects presented to them, and to determine whether these were influenced by the type of instruction given in school

(*b*) To determine whether the method of teaching affected speed or accuracy in the fundamental operations of arithmetic.

II.—SCHOOLS IN WHICH THE TESTS WERE APPLIED.

(*a*) In school A arithmetic was taught by Montessori methods in the lower classes, followed by the Dalton Plan in the higher classes The children work with concrete material, learning their tables in this way and verifying by means of their apparatus the more advanced arithmetical rules such as long division and multiplication Once these rules have been "discovered" by the pupil he discards the material as soon as possible and proceeds to memorise the results. Such a beginning furnishes the pupil with a concrete basis of abstraction, illustrating later the superiority of the abstract methods.

There are many who argue that such concrete aids, if used at all, should be left behind in the infant room lest they should delay the point at which the processes become mechanical (for such a stage must be reached sooner or later) and hinder the development of speed

(*b*) In school B the older class methods were used. Here the processes are made mechanical from the beginning, all attempts at a logical explanation being delayed or omitted altogether on the assumption that, as his mind develops, the pupil will arrive by himself at a full understanding of them.

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*Summarised from a thesis submitted in part fulfilment of the requirements for the degree of Bachelor of Education (Glasgow University).

(*c*) In the Special School, as in school A, Montessori methods were used wherever possible The children tested were mentally defectives whose intelligence quotients had been found by means of the Binet-Simon Intelligence Tests (Stanford Revision).

The children in schools A and B had been tested by the National Intelligence Tests, Scale A—Form 2 These tests include a few questions involving arithmetical work but cannot be said to be dependent on arithmetical ability.

III —TEST I—" SPOT TEST "

This test was used to investigate how children in schools A and B estimated a number of concrete objects. The apparatus used was a card on which were pasted thirty-five red spots (⅜-in diameter), ¾-in apart, arranged in five rows of seven The number of columns and rows visible could be altered by covering with two pieces of cardboard. A child was shown first a row of five spots, and when he had counted them (and had been corrected if mistaken) one of the cards was slipped down to reveal three rows of five The child was then asked how many spots he saw, the time for his reply and his accuracy being noted. This was repeated with four rows of six, five rows of seven, three rows of four, and three rows of three. To estimate the number of spots he might start to count them individually, or he might think of the whole as a sum of three rows of five or as a product of one row three times Other methods, such as counting in twos or seeing patterns, were possible, but on the whole the first three methods were the most common. These will be referred to as " counting," " adding," " multiplying," respectively In a few cases the child counted the first set of spots before seeing the advantage of adding in the second set, but in all the other cases the children were consistent The method of introspection had to be used Each child was asked how he had found the answer Usually his first reply was " I counted them," in which case he had to be told to elaborate his answer. If a child was obviously inventing his method as he described it, this result was discarded, but in all other cases the explanation had to be accepted as valid

Test I was given to classes of approximately the same chronological age in schools A and B, and, for comparison, to all the children in the Special School The intelligence quotients being known, it was possible to arrange the children's answers in groups according to their mental age. As the number of subjects in each mental age-group was small and as the range of I.Q.'s was wide, the usual tests for significance could not be applied to the difference in method, speed or accuracy. Of more interest was the progressive change of method with increasing mental age, the changes from counting to adding and from adding to multiplying taking place in this order, and, as the tables suggest, at roughly the same mental age in the three schools.

The numbers represent the number of answers per cent obtained by multiplication, addition, counting and guessing respectively In cases where a child "added" the first rows and "counted" the next, his answer was divided into two, each half answer being included under the appropriate heading.

TABLE I.

TEST I

SHOWING THE METHOD USED IN THE "SPOT TEST" IN SCHOOL A.

Mental Age	*No of Subjects.*	*Total No of Answers.*	*Per cent answers obtained by*				*Mean chronological Age*
			Multiplication	*Addition*	*Counting*	*Guessing*	
6- 7	—	—	—	—	—	—	—
7- 8	—	—	—	—	—	—	—
8 -9	17	85	30	41·8	28 2	0	8 5
9-10	28	140	50 4	31 8	17·8	0	8 9
10-11	13	65	69 2	24·6	6·2	0	9 10
11-12	3	15	100	0	0	0	10 4
12-13	6	30	83 3	16·7	0	0	10 5

TABLE II.

TEST I.

SHOWING THE METHOD USED IN THE "SPOT TEST" IN SCHOOL B.

Mental Age	*No. of Subjects.*	*Total No. of Answers.*	*Per cent answers obtained by*				*Mean chronological Age.*
			Multiplication	*Addition.*	*Counting*	*Guessing.*	
6- 7	5	25	0	48	52	0	8 6
7- 8	25	125	10 4	55·2	34 4	0	8 10
8- 9	34	170	38 8	40 6	20 6	0	9 3
9-10	46	230	51·3	34 5	13 3	·9	9·6
10-11	31	155	59·7	25·5	14 8	0	9·9
11-12	9	45	60	28·9	11·1	0	9 11
12-13	—	—	—	—	—	—	—

TABLE III

TEST I

SHOWING THE METHOD USED IN THE "SPOT TEST" IN THE SPECIAL SCHOOL.

Mental Age	*No of Subjects*	*Total No of Answers*	*Per cent answers obtained by*				*Mean chronological Age*
			Multiplication	*Addition.*	*Counting*	*Guessing*	
6– 7	21	105	3 3	19·1	71·9	5 7	10·6
7– 8	32	160	10	45·4	40 3	4 3	11 7
8– 9	40	200	33 25	39·5	27 25	0	12 11
9–10	26	130	52 8	28 5	17 7	1 5	13 8
10–11	17	85	73	15·3	11·7	0	14 5
11–12	4	20	65	35	0	0	14·3
12–13	—	—	—	—	—	—	—

Table IV shows the mean total time taken (in seconds) to the five questions by the above groups of children in schools A and B. (Probable errors are given in brackets.)

TABLE IV.

TEST I.

"SPOT TEST" COMPARISON OF MEAN TOTAL TIME IN SCHOOLS A AND B.

M A	*School A*		*School B*	
	No of Subjects.	*Time (secs).*	*Time (secs)*	*No. of Subjects*
6– 7	—	—	53 46 (2·9)	5
7– 8	—	—	42 4 (2 7)	25
8– 9	17	32 7 (2 7)	35·5 (3)	34
9–10	28	28·8 (2)	36 3 (1·5)	46
10–11	13	18·9 (3)	23·1 (3)	31
11–12	3	11·2 (3·5)	23·6 (3)	9
12–13	6	12·4 (3·4)	—	—

The children of school A were quicker with their calculations than those of school B in the corresponding mental-age groups, although, as the first two tables show, corresponding mental age groups used the same method on the whole. This suggests that the child taught by concrete methods, instead of being retarded, becomes speedier than the child who is accustomed to purely mechanical methods.

Table V shows the accuracy (number of correct answers out of the five) in schools A and B.

TABLE V.

TEST I.

"SPOT TEST" COMPARISON OF ACCURACY IN SCHOOLS A AND B

M A	*School A*		*School B*	
	No of Subjects	*Accuracy*	*Accuracy*	*No of Subjects*
6– 7	—	—	3·6	5
7– 8	—	—	4·1	25
8– 9	17	4·2	4·5	34
9–10	28	4·5	4·3	46
10–11	13	4·5	4·6	31
11–12	3	4·3	4·6	9
12–13	6	4·7	—	—

This table shows little difference in accuracy Any loss of accuracy in school A may be due to the increase of speed rather than to the difference in method

IV.—TEST II. "MULTIPLICATION TEST."

As the ability to estimate a number of spots might not be highly correlated with the ability to solve abstract problems, the same pupils were presented with Test II, a simple multiplication test of the form 2×3=, and the following table was drawn up The numbers represent the mean number of questions answered in two minutes, and the mean number of correct answers. (Probable errors are shown in brackets.)

TABLE VI.

TEST II

"MULTIPLICATION TEST" COMPARISON OF SPEEDS IN SCHOOLS A AND B

M A	School A		School B	
	No of Subjects	No Attempted	No Attempted	No. of Subjects
6– 7	—	—	10 4 (3 5)	5
7– 8	—	—	10 8 (2 9)	25
8– 9	17	18·1 (3)	13 8 (2·75)	34
9–10	28	24 1 (3)	16 4 (2)	46
10–11	13	39 4 (1 5)	27 5 (3)	31
11–12	3	48 0 (4)	28 2 (3 4)	9
12–13	6	55 7 (3·5)	—	—

TABLE VII.

TEST II

"MULTIPLICATION TEST." COMPARISON OF ACCURACY IN SCHOOLS A AND B

M A	School A		School B	
	No of Subjects	No Correct	No Correct	No of Subjects
6– 7	—	—	7	5
7– 8	—	—	9 5	25
8– 9	17	17 8	13 0	34
9–10	28	23 3	15 6	46
10–11	13	39 2	26 9	31
11–12	3	48 0	27 8	9
12–13	6	55 7	—	—

These tables showed that the children who had been taught by individual-concrete methods were much speedier than the others, which confirmed the results of Test I. They also appeared more accurate in spite of their increased speed, whether this accuracy was measured by the number attempted or by the ratio of the number attempted to the number correct.

V.—SEX DIFFERENCES

The above tests were given to mixed classes in school A and the special school, and to girls' classes in school B. When the scores of boys and girls were separated the boys on the average scored higher than the girls in speed in both tests, but owing to the small number of boys in each mental age group, tests for the significance of the difference could not be applied.

VI.—SUMMARY.

(*a*) The method of tackling the concrete problem (Test I)—i.e., of estimating a number of spots on a page, changes with increase in mental age, the first step being to count separate spots, the second to add rows, and the third to multiply one row by the number of rows. These steps are taken independent of the method of teaching given in school.

The type of instruction does affect speed, "individual-concrete" methods increasing speed without loss in accuracy.

(*b*) As regards the abstract problem, results have suggested that children trained by "individual-concrete" methods showed increased accuracy combined with higher speed than those trained by class methods

Résumé

UNE COMPARAISON ENTRE LES MÉTHODES "INDIVIDUELLES-CONCRÈTES" ET LES MÉTHODES "DE CLASSE" DANS L'ENSEIGNEMENT DE L'ARITHMÉTIQUE.

On a essayé de montrer, dans cet article, la méthode dont se servent les enfants dans leurs problèmes d'arithmétique Pour obtenir des renseignements sur ce point on présenta à quelques enfants un certain groupe d'objets, en leur demandant combien il y en avait. On arriva à la conclusion que les enfants considèrent les objets comme détachés l'un de l'autre, mais, à mesure qu'ils se développent, ils apprennent à rassembler les groupes et enfin à en découvrir le produit. Ce progrès ne dépend point de la méthode de l'enseignement.

L'on présenta aux mêmes groupes d'enfants quelques problèmes dans lesquels on avait introduit l'opération de la multiplication, et l'on trouva que les enfants habitués aux méthodes concrètes multipliaient aussi correctement et plus rapidement que les enfants habitués aux méthodes ordinaires.

ZUSAMMENFASSUNG

VERGLEICH ZWISCHEN " INDIVIDUELLKONKRETEN " UND " KLASSENMETHODEN " BEIM RECHENUNTERRICHT

In diesem Artikel hat man versucht, die von Kindern bei ihren Rechenproblemen gebrauchte Methode zu zeigen Um Nachforschungen anzustellen, zeigte man einigen Kindern eine gewisse Gruppe Gegenstände, indem man fragte, wieviele es waren Man gelangte zum Schluss, dass die Kinder die Gegenstände getrennt ansehen, aber je nachdem sie heranreifen, fangen sie an die Gruppen zusammenzunehmen, und schliesslich kommen sie zum Ganzen Dieses Fortschreiten ist unabhängig von der Methode des Unterrichts.

Dieselben Gruppen erhielten einige Probleme, wo man das Verfahren der Multiplikation einführte. Es wurde entdeckt, dass die Kinder, die an die konkreten Methoden gewöhnt waren, ebenso richtig und sogar noch schneller multiplizieren konnten als die Kinder, die an die üblichen Methoden gewöhnt waren.

LA CORRECTION DES ÉPREUVES ÉSCRITES DANS LES EXAMENS.

(International Institute Examinations Enquiry. Paris, a la Maison du Livre, 4, Rue Félibien (VI^e), pp. 385.)

THIS report runs into nearly four hundred pages of text and graphs summarising conclusions that have been based upon three principal lines of enquiry: (*a*) questionnaires; (*b*) statistics, and (*c*) examiners' introspections. The investigation sought to find out to what extent the baccalauréat might fail to be a reliable test for those qualities which it has been trusted to discover in the candidates The disclosures which are made in the second and third parts of the report certainly give food for thought; they indicate that certain precautions are necessary if the examination is to retain its integrity in the minds of Frenchmen, who, by the way, appear to set a much higher value on the baccalauréat than the Englishman does on the two school examinations which more or less correspond to it in this country.

The French investigators exploited a bright idea in issuing questionnaires to different kinds of persons likely to have an interest in the "bacheleur" products of the examination, or who might have special knowledge of the examination itself and opinions to express about it The paucity in number of the replies was disappointing and rather hard to account for, unless one accepts the statement that the questions put in the inquiry have been discussed so fully on other occasions that the great majority of those interrogated were tired of them, or felt there was no good purpose to be served by dealing with them again. The people approached were presumably well qualified to speak again, but few did so Did it occur to the investigators to find out what the *candidates* thought of that to which they either had been or were going to be subjected?

An examination implies many considerations which are not always spontaneously appreciated by all those who set papers or mark scripts. It is clear that, as was pointed out in a recent publication to which some of the investigators concerned with the present report contributed, there is room for a docimology or science of examining.[1] Examining is a complicated business in which it is easy, unless precautions are taken, for the examiners to interpret their duties very differently Large panels of examiners are employed for most subjects with which examinations of the baccalauréat type are concerned, and the diversities of judgment among them may lead to troublesome anomalies It is poor comfort to hold that examinations being what they are, and human nature being what it is, there might be even more anomalies than there are

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[1] *Etudes docimologiques sur le Perfectionnement des Examens et Concours.* (Conservatoire National des Arts et Métiers.)

It was therefore wise to ascertain the informed public's views on the purposes of the examination Two questionnaires were issued One was general in scope and was addressed to one thousand persons engaged in commerce, industry, agriculture, and the professions, the second, more specialized in nature, was sent to three thousand persons who had competent knowledge of teaching. The former evoked twenty-one replies, the latter one hundred; but even so few replies gave M Gastinel ample scope for consideration and material to work upon. Among the questions to which answers were sought were those relating to the efficiency of the baccalauréat in setting a hall-mark on acquired knowledge, and on its value from the points of view of sociology, character determination, and citizenship. Further, is the baccalauréat to be regarded as a sanction on the work of the secondary schools, and is it at the same time intended to be a measure of the fitness of successful candidates for certain careers? It is not possible to deal with all the questions actually set forth nor with the summaries and criticisms so carefully drawn up by M Gastinel, but with regard to the dual function of the examination there appears to be division of opinion Admittedly it does serve to sanction and to predict, whether it should do so is another matter. Historically the baccalauréat originated in a stable period when social distinctions were clearly marked; when, although promotions from the lower strata could occur in instances of rare ability, the social conditions kept the number of vacancies low. In those days the baccalauréat could and did function in a selective way and so the examination as a whole served the double purpose A course of levelling has more recently taken place, social barriers have been broken down, stronger emphasis has been put on the claims of intelligence for promotion and so the selective function of the baccalauréat has attained much greater importance. It has in fact the task of forming the national élite.

So far as the publicly-controlled schools are concerned, the dual function seems to be carried out without trouble; the French system lends itself thereto through its organization in the Academies; but private schools create some problems which the examination has been required to meet, and at the same time it is required to give chances for selection to candidates from such schools equal to those given to candidates from public licées and collèges.

The baccalauréat is held in two parts, success in the first of which qualifies for admission to the second; the principle is that this division permits of some measure of association between the kind of secondary education afforded and the means for selecting persons with the best brains to proceed to higher studies of different and more specialized kinds. The claim is that great differences are revealed in the period between a first and a second school examination and special aptitudes develop. The first school examination is in a sense retrospective, a check on what has been done. In the period immediately following a prospective attitude is taken and it is settled whether the student is fitted for the arts or the sciences. The second examination is concerned with the answer to this question. The first part bears upon knowledge or abilities which are too general to indicate specific aptitudes, the second part checks specific ability more precisely and so bears on selection.

In a cultured Frenchman's opinion, education does more than convey knowledge; some appear to expect the baccalauréat to discriminate qualities of character in no slight degree It must for example single out uprightness, toleration, modesty, ability to study; it should be a means of stimulus for developing taste and a sense of proportion with the power to pick out essentials in all manner of problems; it should promote habits of accurate thought and the power to reason both inductively and deductively The baccalauréat is thus bound up with the whole educative process, it is obvious that the examiner is, in fact, expected to bear the responsibility of real control over the whole of school life and organization.

The questionnaires elicited opinions, by no means always in agreement, upon topics such as the technique of examinations, the conditions under which they are held, the choice of examination subjects, the importance which should be attached to written work, to oral examinations, etc.

The examiner is expected then to test knowledge, not merely as such, but as it is orientated with regard to character, and mental and moral habits

M. Gastinel must have found scope for his critical powers in collating the replies, because they were often at variance with one another, sometimes to the point of contradiction and not always to the point of the question. He finds it necessary to give a historical statement to account for divergencies of opinions and the tenacity with which they are held. He says that teachers sometimes hold very strong views about examinations and are jealous of any interference with the established position, they have, however, recognized how much discredit is likely to fall on the examination and in consequence upon secondary education itself because of the close link between the two. In face of the actual disagreements which have been shown to exist between examiners something must be done.

Existing anomalies are the outcome of an examiner's independence being indulged to an extreme If examiners carry on their work with different ideals, one cannot be surprised that the results fail to be comparable or that their marks cannot be brought together in one series. It is just the degree of variation set up in this way that is the subject of the investigation described in Part II of the Report. But after reading the report on the questionnaires, the first remedy that comes to mind is by seeking means to induce examiners to agree to a set of fundamental principles for their guidance at the appropriate stages of the examination Again and again as one reads one comes back to this necessity. Some kind of means for securing agreement is mentioned as being in existence already, but it is at too late a stage, just before the final decisions, in fact, and the impression left in the reader's mind is the need for making preliminary agreement a first call on attention. It is perhaps one of the strongest criticisms to be made with regard to the statistical section that a control investigation was not carried out to determine what reliability could be put on marks assigned by examiners who had had some preliminary coaching on a prescribed basis, as compared with such reliability as was disclosed in the report.

One turns from Section I with its expressions of opinion, authoritative no doubt, but still only subjective opinion all the same, and thereby liable to be misleading, to Section II, which is a survey of objective material. It brings many brute facts and theoretical considerations before us and indicates some of the ways in which the mathematician can assist the examiner. The investigators are concerned with showing what variations might be found between examiners in respect of their marks supposing they are concerned with marking identical matter. The results are very important and it does not detract from that importance to note that if what was wanted to be shown was the effect of setting examiners to work without preliminary understanding between them, the investigators have achieved their purpose If the non-mathematical reader feels that he must take the text as read, he can still get an informative insight into the matter by studying the graphs, which are clear and helpful. Variations between marks are of such a measure that candidates who have been passed by some examiners are failed, sometimes badly, by others. If this were merely the result of differences in standards, some examiners marking low while others marked high but all maintaining close parallelism between their marks, there would not be much cause for concern because mathematics can supply a graph or a formula to bring marks into line with a suitable standard. But the correlations obtained in the inquiry do not justify the assumption that marks can be brought into a common series. The plan of the investigation indeed did nothing to promote correlation. It dealt with the marks of one hundred scripts which had been worked at an examination in each of the subjects—Latin, French Composition, English, and Mathematics representing Part I of the baccalauréat, and in Philosophy and Physics representing Part II. These scripts had been valued already for the purpose of the actual examination, the marks awarded were known as those of Examiner A. The scripts were copied and the copies were submitted to five other examiners in each subject who were invited to take part in the test marking. It is important to note that the original scripts were not seen by these five examiners, because some qualities of the candidates were removed from the material the examiners were asked to assess Photostatic copies would to some extent have retained most of the characters of the original scripts The representative nature of the specimens selected was checked by comparing their average marks and the standard deviations with those of four hundred and fifty other scripts worked at the same examination.

The sample scripts were marked by the five examiners in each subject, so that when A's marks were brought into account there were six sets of marks A's mark was really a final mark at the examination, and an adjusted mark for the purposes of that examination. It could therefore be taken as indicating a standard

There may be some doubt if the examiners in this instance can be regarded as marking under examination conditions.

The following observations are made.

1.—Wide divergencies were noted in the marking, they varied from thirteen marks out of twenty in French Composition to eight marks out of twenty in Physics.

2.—A study of the average mark and the scatter of the marks awarded by each examiner indicated unequal standards in marking, and the application of different scales of marking, according to the examiner's own opinion.

As already pointed out, the differences between the magnitudes of the average marks and between their respective scatters need not unduly trouble us, for they can be corrected. The troublesome fact is that perfect correlations are not found, in fact they range as low as 0·112 in Philosophy, although in exact studies such as Mathematics and Physics they stand much higher. The absence of preliminary discussions seems responsible for this unsatisfactory result, and it is here that a control test would have been of value. If it is held as a matter of opinion that preliminary agreements are desirable, a test could easily have been designed and carried out so that its results could have been brought in at this point

3.—When subjects have been examined by double papers, as in English, Mathematics, and Physics, higher correlations were found and assumed to indicate greater reliability in prediction of one examiner's marks from another's.

This might suggest that a true assessment of a candidate's value could be secured by setting more than one paper in the subject The method is open to obvious objections in practice The investigators have pointed out another method which is interesting, but they reject it as being impracticable Apart from its academic interest in the science of examining, it is useless where time, economy and some other factors are concerned It is this, mathematical means exist whereby the ideal numbers of examiners for each of the different subjects can be found, the obtension of the data from which the numbers can be calculated is itself at least as formidable as the marking method described above wherein six examiners are involved, but in the end it appears that under similar conditions each script in mathematics would have to be marked by thirteen examiners, and each one in philosophy would need no less than one hundred and twenty-seven examiners ! The other subjects of this examination require intermediate-sized panels. As a practical method of dealing with the problems discussed in the report, there is no value in this, but it may have its bearings in time in the production of applicable principles Remembering the history of every science, one would not wish to suggest the entire uselessness of what the investigators have brought to notice; the applicability to present problems is in question

4.—An important practical point is that the subjects fall into definite groups when they are considered in the light of the variations between examiners. The least variation is in Mathematics and the greatest is found in French Composition and Philosophy The grouping is worth further study, some years ago Crofts and Jones[1] showed that in the English School Certificate two marked groupings existed. The baccalauréat with its fifteen thousands of candidates should furnish informative marks distribution graphs.

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[1] J M. CROFTS AND I CARADOG JONES *Secondary School Examination Statistics.*

5.—It would be expected that a script which is marked by a jury of examiners would be more reliably marked than if the judgment of one examiner only were taken In fact the investigators assume this is so when they adopt the Spearman-Brown formula to get the number of examiners requisite for a "true" mark. And expectation is confirmed by figures. Considering separate marking, between 36 per cent and 81 per cent of the candidates, according to the subject examined, who have been passed by one examiner, are rejected by the other five. When examined by "juries" those who are refused by one jury are more likely to be refused by other juries than those accepted by one are to be accepted by another in a proportion of 95 to 68.

On the whole it seems that the candidates who have the best chance of passing the whole panel are those who gain 159 or marks more out of 260, and chances of failure are equally high for those who are awarded 101 out of 260. it would follow from this that candidates who score marks between 101 and 159 (of 260) have varying but precarious chances of success or failure. As these candidates get somewhere about the median mark, they constitute a large proportion of the total number of entrants and yet have doubtful chances. In the second part of the mathematical investigation three scripts in French Composition were marked by 76 examiners. By the way, the calculated number of examiners for the purposes of arriving at the "true" mark for a script is shown to be 78, so one might suppose that the average mark of the 76 would be very close to the "true" mark; nevertheless, remarkable variations appear. Marked on a basis of 80 marks, one script gained marks varying from 4 to 52; a second from 12 to 64, and the third from 16 to 56.

These differences are surprising as M Desclos notes in his summary, but we have to remember how the data for the investigation was derived. The scripts were, it is true, worked by candidates under the usual conditions of examination, but it is open to question that the marking for the purposes of the statisticians was done under the conditions of examination marking. There is a vast difference between being under such conditions in fact and imagining oneself to be under them. Similarly, the examiners' introspections which are dealt with in the Third Section of the Report may come under suspicion. When an examiner is under obligation to furnish marks against time he has not time to introspect, and if he marks *and* introspects, his marking is liable to suffer in some vague indefinable way, but at all events so as to falsify his standard.

The present reader would be happier if he could see the results which emerge from this really excellent statistical report compared with results furnished by examiners who had been coached carefully for their task Such a comparison would have helped to settle objectively whether an examiner should be left to his own devices, or is a better examiner from every point of view if aided by preliminary discussions and advice But none will suppose that the procedure will entirely cut out the occurrence of vagaries in marks The personal factors will always remain, and these can be dealt with in all probability only by careful selection of the examiners, as M Desclos mentions in his summary of the whole report

The statistical analysis has indicated a measure of human error in marking and some ways in which it can be compensated, but its main value lies in the suggestion it gives of the potentialities possessed by mathematics to help in the scrutiny of marks and in their adjustment. The investigators were bound by the terms of their reference to close their report without suggesting practical methods of co-ordinating marks Many people who have been interested in the problems of examining are quite aware of most, if not all, that this report contains on the mathematical side, it has served, however, to bring together material which may subsequently make a very definite contribution to the theory of examining

When one studies the exact figures relating to the number of candidates who, having been passed by one examiner will probably be passed by others up to the limits of the whole panel, it is indicated that the upper and the lower ranges of marks do not give cause for trouble; it is those who are neither good nor bad who cause most anxiety. And the variations of marks in such instances may be considerable

The report mentions the effect of marking or withholding marks according to a scale. A script may deserve two marks for points made by the candidate who then makes an error which costs him one mark Another script earns eighteen marks and loses one on the penalty It appears to be suggested that because the first loses 50 per cent, whereas the second loses only about 5½ per cent, there is injustice due to equality of steps in the scale of marks. If this be the idea, it is hardly of great importance, for if a candidate scores a very low mark and makes mistakes he is probably weak in any instance, and does not deserve to pass, whereas one who makes a good score is probably a good candidate and has likely enough made his error for causes quite different from those behind the mistake of the weak candidate.

Rising out of this comes the query whether the numerical mark is the best basis of assessing a candidate's ability Opinions will be divided on this matter. The numerical mark has the advantage of being able to be criticized on an objective scale, but it is admittedly not an ideal basis for every subject of examination, or perhaps at all stages of examination in the same study, for example as between an elementary stage, and an advanced stage, but a discussion will most likely be made in a later inquiry

Examiner A was the original examiner of the scripts He was really a board of examiners who had moderated the candidates' marks and so the results of the actual examination were neither so inexact nor so haphazard as they may seem to be at first sight Deliberations which precede *the final decision* reduce the uncertainties of marking, but these are as M. Desclos remarks, still too considerable, modifications of the present methods seem to be desirable, especially as the baccalauréat is so closely linked up with national tradition.

The final summarizing section indicates steps that should be taken. The examiner is to be chosen with care, one will agree that the authorities who bear the responsibility for examinations must exercise control over marking, and if a sufficient number of competent examiners cannot be found in Paris they ought to be selected from the provincial academies There should be no insuperable difficulties here, and it would probably be advantageous to select examiners from a wider area than now appears to be done. It would be easier to discard unsatisfactory examiners, and teachers over a wide area would be brought into touch with the examination system, its procedure, and its ideals. So, if there is anything in the claim that the examinations exercise close control over methods of instruction, the secondary education over the whole country might be expected to benefit. We should agree that not all good teachers are good examiners; it is no disgrace that a good teacher falls short as an examiner, and unsatisfactory examiners ought not to be allowed to continue to examine.

In the next place, it is desirable to set up agreed standards. This will not, in France at least, prove an easy task at first, because hitherto so much liberty appears to have been left to examiners, some resentment may be felt among them at any movement which can be interpreted as attempting to restrict established traditions of freedom. Against this one ought to set the sound common sense of the examiners who realize what an unsatisfactory position the report has disclosed. No doubt all will wish the examinations to be above reproach and will have taken some of the lessons of the inquiry to heart.

M. Desclos suggests meetings of examiners as a means of getting agreement It will be almost impracticable to carry out the programme as it is set down on page 381, but could not some method be tried such as examiners under the Northern Universities Joint Matriculation Board have been familiar with for years past?

At all events, it is worth trying, if only to gain the material for objective study in a further investigation It seems a weakness of the inquiry under review that the method did not set up a control investigation, by which scripts could be marked under the proposed conditions. Again one's mind turns to measures for promoting preliminary agreement as a solution to the greater part of the problem. But the difficulty of carrying this out can be appreciated in the present instance

One will probably agree that marking to a numerical scale is not entirely satisfactory Any experienced examiner knows its drawbacks, but an examiner can be given discretionary powers to indicate his subjective opinion as well by adding or subtracting marks He seems likely to get the true value of the script in this way, though it is again a point for an objective test.

The inquiry dealt with scripts only In the actual practice of the baccalauréat, the scholastic record is available. This is surely important —at least in marginal instances—and can do much to insure that the decisions of Examiner A are in each paper the best approaches to truth about a candidate. A jury, and A *is* a jury, will always include someone at least who could help a candidate when any doubt arises.

Further inquiries may be carried out on the technique of oral examinations, on tests of reliability of examinations; on the types of questions set; and on the valuation of scripts as they indicate knowledge, standard of intellectual ability, or are predictive of capacity

The report of the inquiry is a valuable piece of work within the restricted terms of reference. It is clear from the critical summaries made by the investigators themselves on the evidence they have collated that they appreciate the position and have made it clear even for members of the general public. The criticisms have been made tactfully and it is likely examiners will have been encouraged to co-operate in securing a large measure of improvement in the future.

A. P. BRADDOCK.

BOOK REVIEWS.

Educational Psychology: By NOEL B CUFF. (The Standard Publishing Co., Louisville, Kentucky, pp vi+387. $2 50)

This book covers a considerable range of topics. It opens with a short chapter on the field of educational psychology. It is shown that there is little agreement between text-book writers as to what should be included in a text-book on educational psychology—the topics most frequently included in educational psychology and the student preference topics are listed

Although the author has evidently given considerable thought to the content of his book, yet, in my opinion, he is far from solving the problem For example, in his second chapter, he deals with the scientific study of heredity, but a study of Mendel's laws is as remote from the field of educational psychology as are courses in mechanics or mushroom growing, while a discussion on genes and chromosomes does little to assist in our study of psychology as applied to education, for it is a far throw from a fruit fly to a human being If students of education must have a biological background then let them do a straightout course in biology and keep our educational texts clear of the hypothetical genes and the harshly judged Jukes.

The bulk of the book is suggestive but scrappy, too often research of an inconclusive and unimportant kind is quoted while insufficient attention is paid to outstanding research results

The third chapter in the book is concerned with growth and development from the physical standpoint, and although useful material is provided there is little attempt to show the importance of the relationship between physical and mental conditions.

A suggestive, but all too short, fourth chapter is concerned with incentives and motives, which are grouped under these headings (1) punishment, (2) rewards, (3) attitude, purpose or aim, (4) knowledge of results, (5) competition and rivalry, (6) praise and blame, (7) success and failure, (8) play, (9) tests, (10) comparative studies

Chapters on feelings, attitudes and emotions and mental hygiene then lead on to a consideration of intelligence and its measurement, which forms one of the most valuable sections of the book

Chapter VIII—Individual Differences and the School—provides some really practical educational psychology, which is more than can be said for some parts of the succeeding ninety-five pages, all devoted to the learning process, in which there are too many references to mechanical situations and to the learning reactions of chimpanzees and hungry dogs and not enough to pupils in classrooms

Final chapters of the book cover transfer of training, measurement of learning (i.e, tests and measures of central tendency, variability and correlation), reasoning, imagining and problem solving, socialisation and guidance.

Each chapter in the book is followed by 14 to 15 questions and problems, 25 to 40 true, false, and multiple choice test items, and 20 to 25 selected references, but a reading of the book suggests that this might easily have been halved and the resultant space devoted to a fuller consideration of some topics On the whole the book should provide a useful introduction to some aspects of educational psychology

F.J.S.

The Psychology of Feeling and Emotion By CHRISTIAN A RUCKMICK. (London. McGraw-Hill Publishing Company, Ltd., 1936, pp. xiii+529. 25s)

It is significant that the author-index of the book under review is about twice as long as the subject-index, and the impression given is that the psychology of emotion still contains far more discussion than established fact This book will be of great service to the advanced student who seeks for guidance through the controversial labyrinth of the subject Professor Ruckmick has provided him with a well-organized and clearly written digest of the theoretical and experimental studies of affection, using (modestly enough) his own point of view to give direction to his criticisms The customary American machinery of summary and review questions to each chapter is employed with more skill than usual, the summaries being no mere précis of the foregoing material The wealth of references and quotations, which will make the book valuable to the student, prevent it being easy reading as a whole, but when Professor Ruckmick can permit himself a piece of continuous exposition it is very clear and interesting Methods as well as theories are systematically discussed

The only adverse criticism we have to make concerns the first two chapters ("A Survey of the Affective Life" and "A Historical Perspective"), which we feel are too superficial to be of service to those readers who require them. And slovenly statements, as on page 113 (to the effect that Malebranche and Spinoza were about a century later than Descartes), are regrettable blemishes on an otherwise excellent book

The Prognostic Value of Some Psychological Tests: By E. Farmer and E. G. Chambers. Medical Research Council Industrial Health Research Board, Report No 74. (H.M. Stationery Office, 1936, pp. 41. 9d.)

It must be admitted that we still know very little of the psychological functions which underlie performance in tests of vocational abilities and aptitudes, and that vocational guidance is still mainly empirical

This lack of knowledge is in part at least responsible for the very unsatisfactory state of the classifications of tests. With these two points in mind a reader of this report may congratulate the authors on the courage behind this attempt to survey the field of experiment, so far as it covers tests for vocational aptitudes, in an endeavour to show how the various psychological functions examined are interrelated Conclusions are drawn from a number of experiments, and it is claimed that though these conclusions are tentative, they add something to psychological knowledge by indicating the degree of association between certain psychological functions and the part which these functions, as measured by tests, play in occupational proficiency. Temperamental factors are intentionally omitted

The report falls into three divisions Part I, The relation between certain tests (e g, Intelligence Tests, Mechanical Tests, Sensori-motor Tests) and industrial proficiency; Part II, The value of various tests in different industrial groups; Part III, Group factors in the tests.

As regards a point mentioned earlier, namely, the classification of tests, the authors have not shown as much courage They take the view that any classification of psychological tests is arbitrary. This is true to some extent, but the admission does not preclude an effort to make a classification as meaningful as knowledge will allow. To take one small example, can we still not do any better than call the Cube Test an "Intelligence Test" and the Substitution Test a "Mental Test"?

Psychometrics: By J. O'Connor. (London: Humphrey Milford · Oxford University Press, pp. 292+xxxiv. 15s.)

The preface tells us that this is a study in the human substance of industrial relationships The author, with others, has been trying to isolate and measure separable elements in the complex of human character to determine their significance in industrial affairs Ways and means of evaluating the reliability of tests are dealt with

The volume is divided into three parts The first demonstrates that by averaging a sufficient number of individual measurements it is possible to gain accurate results The second is a discussion of the correlation co-efficient which is generally used as a means of expressing the accuracy of the individual measurement. The third shows some of the causes of variation from one individual to another (e g, interest, nervousness, fatigue, skill, age and sex are examined) and demonstrates ways of approaching the individual and gaining a better understanding of his reactions

It is impossible to consider the research in detail, but it is of interest to note that five characteristics common to men and women in executive positions appear to be large English vocabulary, many distinct aptitudes, objective or extremely objective personality, accounting aptitude, and aptitude for their first position It is suggested that the last-named probably gave a valuable confidence and feeling of success

It is pointed out that psychological research must uncover and isolate more and more unit characteristics until their sum-total gives a completely co-ordinated picture of the whole individual, and that psychology must develop a technique which will enable it to isolate each mental element A parallel is drawn between this and the procedure in chemistry in its initial steps in the search for chemical elements.

Many will agree with the complaint that although a constantly increasing amount of excellent work is being done in psychology, and in the more limited field of psychometrics, each worker publishes his results in a way just different enough from others so that either a direct comparison or an integration of results is difficult and often impossible

A technique, the writer asserts, is needed by means of which each worker can check his results with those of his predecessors until finally the results which have already been published can be accepted and built upon with confidence

Performance Tests of Intelligence: By JAMES DREVER AND MARY COLLINS. (Oliver and Boyd, pp. 55 5s)

This is the second edition of this booklet, which provides non-linguistic tests for deaf and normal children Its usefulness is further increased by the new material in this edition There are new norms based on a further testing of 1,500 children, and as these results indicated an appreciable sex difference, separate norms are given for boys and girls, the boys in general gaining higher scores than the girls consistently from the age of five to the age of fifteen.

In addition, instructions have been added for giving the tests with a minimum of language to children who can hear. (But may not this affect the comparative norms ?)

These are welcome improvements to an already very handy booklet If the authors in a further edition could add norms for separate tests it would be useful, more particularly in the training of students when full series of tests cannot always be given.

Reactions of the Human Machine By J. Y DENT. (London: Victor Gollancz, Ltd, pp. 288 8s. 6d net.)

The author of this book tells us in his Preface that the book is " an attempt at an objective description of human behaviour " It is a plea " for the physiological, material attitude of patients and doctors towards life and its discomforts and for the exclusion of magic and the supernatural from the treatment of the human mechanism " It is therefore a presentation of some of the ideas associated with behaviourism The book is interesting and will possibly, with the aid of the exaggerated statements on the dust-proof cover, be widely read. The student of psychology, however, will make a plentiful use of his blue pencil

The Essentials of Psychology By A. H. ALLSOPP. (London · J. M. Dent and Sons, Ltd, pp. 231+vii 7s 6d. net)

The author of this introductory handbook on psychology for student teachers is lecturer in psychology and physiology at the Government Training College, Pietermaritzburg He has confined his attention in this volume entirely to psychology and the reader is thus spared from having to peruse chapters on elementary physiology and structure of the nervous system.

The first two chapters deal with the aim of education and a discussion on liberal and vocational education Several chapters are devoted to the elucidation of the problems of the formation of character, and follow, in general, the treatment of instinct, emotion, and sentiment as developed by McDougall. The remaining chapters are concerned with the psychology of habit, memory, the learning process, and intelligence, with some attention being given to the question of the unconscious motive in children.

Mr Allsopp is much indebted to McDougall and Dewey, and he has written an interesting book which will probably find its way into many training colleges.

The Health of the Mind By J. R. REES (London. Faber and Faber, Ltd., pp. 230. 6s. net.)

The first edition of this book appeared in 1929, and the present reviewer was pleased then to write very favourably about it. A second edition has now been called for and although the main outline remains the same some revision has been undertaken and the whole has been brought up-to-date. Dr Rees is so well known that a book bearing his name must be sound in its principles and practice. He has, moreover, the gift of writing in an interesting and stimulating way.

Clinical Studies in Speech Therapy By ANNE H. MCALLISTER. (Univ. of Lond. Press, pp. xxiv+376 15s.)

This extremely thorough book is rich in information regarding both the theories of speech therapy and their application in Miss McAllister's own experience at the Glasgow University Education Clinic. The desire to quote copiously indicates clearly that the book must be read in order to be appreciated adequately. The author sets out firstly "to lay bare the many-sidedness of the ætiology of speech disorders and to emphasize the necessity for reasonable and scientific therapeutics." In this she has most definitely succeeded—possibly at the expense of her second aim that the book should be of value to all interested in the sufferer from a speech defect. The wealth of detail and the division of the problems into so many sections is inclined to bewilder the "lay" reader. But Miss McAllister's desire "to furnish the beginner in speech therapy with clinical methods of diagnosis and treatment" is entirely satisfied.

Speech defects are divided, very rightly, into two main groups: stammering (i.e., lisping, lalling, etc.) and stuttering (i.e., lack of fluency), and the representative cases described (twenty-four of stammering and 139 of stuttering) are excellently chosen for variety of age, social circumstance, and underlying cause. The course of treatment for any case is based on the belief, frequently repeated throughout the book, that in all people suffering from a speech defect there is to be traced a speech weakness which is the original cause of the emotional disturbance which, in turn, establishes the faulty speech habit. It is by no means certain that this theory has been proved with the stutterers, for Miss McAllister acknowledges that the value of some of her phonological treatment is mainly suggestive and in describing, for example, Cases No. 30 and 40, she states that the harm was done not by the respective left-handedness and mimicry, but by the coincident emotional experiences. However, as it is reiterated with equally impressive frequency that the physiological and the emotional treatment must go hand in hand, it is perhaps unnecessary to quarrel with what may be merely a personal bias. That an extremely well-balanced system is advocated is proved by the formidable list of sciences (ranging from psychiatry to orthophonics), in which it is stated that the speech therapist must be "well-informed."

The somewhat unusual arrangement of the book, the general theories being revealed primarily through the descriptions of the cases, is for the most part impressive. But had the chapters "General Methods of Treatment" appeared at the beginning of their respective sections, it would have been possible to follow the reports with far less distraction. In places there is a little vagueness. For example, "Bluemel's method" is constantly referred to, but, even in the chapter dealing with "Theories of Stuttering" it is but sparingly described. The style is commendably non-technical and the use of unnecessarily unusual words, such as "goitrous" and "imbalance," is rare.

It is to be hoped that Miss McAllister's apparent condescension towards those who believe in the value of group lessons (see p. 345) is unintentional. While she confesses that speech defects are symptoms of a social maladjustment, in referring to classes for stutterers she completely ignores the possible social value of group work

Although one cannot agree entirely with Miss McAllister's findings, this book remains intensely interesting, valuable and stimulating, especially to her fellow speech therapists, for whom it will prove both fascinating and authoritative

H R

Education of To-day . Edited by E. D LABORDE. (Cambridge University Press, pp xii+176. 10s. 6d)

This is a series of addresses delivered at the third Young Public School Masters' Conference at Harrow in 1935 It is a sign of the times that as many as 130 public school masters attended these lectures. They can hardly have failed to find them stimulating as well as delightful to listen to.

A bald outline of each lecture would be a most inadequate review. From the titles of the lectures given below, it will be seen that the topics represent a very wide range and a number are concerned with school education only indirectly In the others a teacher who has had a substantial training in psychology and education will find little that is new Even Crichton-Miller's lecture on " The Psychology of the Post-War Boy" is of a popular type with many free generalizations But the reader should gain much from the breadth of treatment in the lectures

We will make only two or three brief comments First, it is somewhat intriguing to have in the same volume the lecture by Mr Zilliacus on " The Modern Movement in Education," and also that on " Leadership " by the Managing Director of Shell Transport and Trading Company, telling the public schools how splendid their work is as a preparation for leadership, how " by the process of competition which applies to every activity in a public school there emerge at the top of the school boys who possess the qualities of intellect and character which are essential to those whom the country requires to lead us back to our place in the forefront of the world's commerce and industry "

Dr L. P Jack's lecture on " Physical Culture " is suggestive and stimulating, though marred by a tendency to let words and phrases, which can be vaguely applied both to physical training and to mental efficiency, obscure some fallacious arguments Thus " physical culture is to give the boy more control over himself, more consistency than the average individual now has " Again, the mind is said to be " a moving thing . . . its powers of concentration being at their highest when it moves at its natural rhythm." If that is so, why are not natural "illiterate" movements enough?

In quite another way, Dr Dover Wilson's article should be found of intense interest

The remaining lectures, which are preceded by an Introduction by Lord Eustace Percy, are as follows " Education in Citizenship," by Spencer Leeson , " The Teaching of Current Events," by C H. K. Marten , " The World's Societies," by H J Fleure ; " The Teaching of the Classics," by Cyril Bailey , " Modern Languages and Internationalism," by the Rev H. J. Chaytor , " Personality and War," by Wickham Steed , " Education for World Citizenship," by Laurin Zilliacus , " Education for Leisure," by T F Coade , " Personal Religion," by the Rev. Geoffrey Allen , and " Christianity and Education," by Dom Martin Collett

Education with a Tradition: By MADAME O'LEARY. (University of London Press, pp. xxxiii+340. 12s. 6d.)

By this book Madame O'Leary deserves well of the student of educational history, for she has indeed, as Professor F A. Cavenagh writes in the Preface, rendered accessible to the general public facts which would otherwise have remained unknown Catholics have made much history in Education, but they have written little, and so generation succeeds generation often not suspecting the work that has gone into that which is to hand and so taken for granted , unfortunately that is what causes our knowledge of monastic schools to be so scanty. From one point of view it is easy to understand why religious persons have not published their records. They are busy people concerned with life perhaps even with more intense concentration on what is to come afterwards than are the laity, but most certainly they have all their energies centred on the particular work for which they have taken special " vows." Occasionally a large community can permit a member privileges which work in with her duties, and in " Education with a Tradition " we have one result of such wise allocation of duty The author has approached her task with a warmth of feeling that permeates the whole book and has shown how the Society of the Sacred Heart has carried on the work originated through St Madeleine Sophie Barat, who took up the apostolate of teaching, like many others, in a France still shuddering from the shocks of revolution

The eighteenth century can just, and only just claim to record the origin of this community of religious women, and Madame O'Leary has written up the story of work accomplished in one hundred and thirty-six years from its inception It is a story that all can read with pleasure, for in spite of documentation and footnotes, such as to delight the hearts of assessors of a Doctorate Thesis, it has a human strain running throughout and is enlivened by accounts of many incidents which help the reader to realize the nature of the work undertaken by the nuns and the spirit with which it was carried out

Quite properly the author has given us a background in the early chapters; she tells of education in a Cistercian Abbey, in an Ursuline Convent and at Saint Cyr At first it seems strange that in a work dedicated principally to an account of girls' education, a considerable chapter is devoted to the education of boys But we are reminded of the relation of the Society of the Sacred Heart to the Society of Jesus, and also that with the latter body labouring alongside the Brothers of Christian Instruction in educating boys, the picture of girls' education in the early years would be incomplete were they to be left without notice

Girls' education has followed its own lines Madame O'Leary traces the development in many countries and incidentally gives information about the lives of the nuns and the genius of some of the Superiors But it is impossible in this review to give full weight to the value of the history she has opened out. The book must be read, one can honestly wish it the success it richly deserves, and trust that its example will induce members of other great teaching communities to put their deeds on record available for a general public How interesting it would be to know from modern compilation what has been done in the cause of education and morality by the Ursulines, the Sisters of Notre Dame, the Sisters of Charity of St Paul, the Marists, and the sons of Edmund Rich, as well as those of St John Baptiste de la Salle, and the Oratorians, here are a few communities mentioned at hazard whose labours in the cause of Catholic education ought to be recorded. A.P B

Genetics · By H S. JENNINGS. (London . Faber and Faber, Ltd., pp 351, 15s)

It is difficult to imagine a more lucid and interesting account of an extremely complicated subject than we are given in this volume by Professor H S Jennings of The Johns Hopkins University. No fewer than seventy illustrations add considerably to the clarity and interest

Early in the book it is pointed out that though strictly speaking the province of genetics is the study of the influence of the different materials with which different individuals begin life, i.e, the materials inherited from previous generations, yet with the effects of heredity are so closely intertwined the results of environment, i e, the influence of the way the materials are treated and the conditions to which they are subjected, that one cannot be dealt with separately from the other.

A study of genetics involves an understanding of certain detailed facts and relations which are presented in this book in as sharply defined a form as possible

Perhaps the best way to give some idea of the scope and arrangement of the book is to refer briefly to some of the topics dealt with in the fourteen chapters. We begin with an account of the materials of heredity, the germ cells and chromosomes, and an account of the results of such modifications as the removal of a chromosome and of the substitution of one chromosome for another Differences between the sexes, and the relation of chromosomes of parents to those of offspring, are then discussed

The operation of the genetic system is exemplified by its relation to sex, and we pass on to consider the relation of the genetic system to different characteristics, e.g., hæmophilia, colour blindness, near-sightedness, just to mention a few

In considering genes and their relation to different characteristics and to chromosomes the question arises, What kinds of characteristics are affected by genes? In the answer to this question is included a very interesting account of identical twins in man which deals with physical and mental similarities and differences both with regard to heredity and to environment

The remaining chapters treat of such topics as the effects of mixing diverse organisms, hybridization, domestication, genetic variations, such as deficiencies, inversions and translocations Mutations are discussed in the final chapter and are considered in relation to progressive evolution

It is not only those who wish to know something of this subject in general who will appreciate this book Its value to more advanced or technical students is enhanced by the references to sources which are collected into notes at the ends of chapters In addition to books and monographs on the better known matters, sources of recent knowledge, not yet unified, e.g, original papers, are given

Handbook of Vocational Guidance · By C. A. OAKLEY and A. MACRAE . (Univ. of Lond Press, Ltd., pp. 337+xvii 10s 6d.)

The contents of this book are a preface by Dr C S Myers, an introduction by the authors, six chapters, an excellent classified bibliography, an index, and four plates showing tests being applied

The sixth and final chapter occupies three-fifths of the book and is devoted to an extensive occupation survey In process of compiling this survey, the authors visited education directors, secretaries, or other officers of more than eighty organizations, of which a long list is given, and discussed with them the qualities they thought most necessary for success in the vocations with which they were associated The chief purpose of the survey is to give an analysis of the abilities and temperamental qualities required for vocational success in a large number of vocations, most of which demand secondary and higher education. The scope of the survey was not limited to this analysis and a great deal of information is given regarding the length and kind of training needed and the annual number of entrants. As the writers point out, their list of abilities and temperamental traits could easily be criticized, and the pitying smiles they anticipate will, one may dare to hope, come long before the fifty years they suggest, but this is only to be expected and desired where a rapidly-growing young subject is concerned As Dr Myers mentions in his preface, in an attempt such as this there must inevitably be inaccuracies and omissions, but future editions will provide a place for corrections and additions

Chapter V provides a great contrast to Chapter VI One part of it is written by one of the authors of the book and the other by Dr E O. Mercer It describes two "cases," John Jones and Elizabeth Brown, in detail We follow the investigation of these cases from the time they first enter the National Institute of Industrial Psychology, each accompanied by a parent, to the time when, all available information having been collected from different sources, suggestions are made for the choice of a career.

The other chapters outlined are, respectively: The Need for Vocational Guidance, Intelligence, Special Abilities and other Qualities, Test Material, and the Technique of the Vocational Guidance Examination

A difficult task has been well performed, and this book is sure to prove very useful to all engaged in vocational guidance of any kind as well as very interesting to the general reader

Führungslehre des Unterrichts · By PETER PETERSEN, (Verlag von Julius Beltz-Langensalza, pp. 264.)

The best approach to this book is, perhaps, by way of the two concluding chapters, after which the reader can proceed to the beginning The title is propitious, if slightly unexpected Occasionally one is conscious of a rather strained effect in laudatory references to North German realism, and leadership, and denunciation of liberalism, and past forms of education, but the remarks are never aggressive and the arguments are reasoned The style is vigorous and not wanting in humour Breakfast is a new kind of pedagogical situation !

This distinguished author discusses the results of sixteen years' uninterrupted experiments The book refers almost exclusively to the ten years' Volksschule We are given a detailed statement of the aims and achievements of the famous Jena Plan, its effects at home and abroad Of greatest interest, perhaps, are the descriptions of the arrangement of the Jena room and the report circles Countless practical hints are given, not only for the execution of the Jena plan, but equally important, how not to execute it.

Petersen denounces the older forms of teaching, where all emphasis was laid on the acquisition of knowledge, but is almost equally scornful of much of the freedom in education during the Weimar régime While hostile to drilling and hectoring, he dislikes self-government Pre-war instruction he deplores, but much of the post-war methods he finds sentimental According to Petersen the two main faults until recently are the over-estimation of the rational elements and the educative possibilities of instruction The general ideas expressed are completely but not blatantly in favour of National Socialist postulates in education, but it is curious that although the author complains of the protests made by the public about the burden of the Staatsjugendtag—which has his approval—since the publication of this book the Staatsjugendtag has been removed by the Ministry of Education which instituted it

A T

Primitive Behaviour By WILLIAM I. THOMAS. (McGraw Hill, pp. ix+847 30s)

The key concept of Professor Thomas's book, "Primitive Behaviour," is the *definition of the situation*, which, he says, precedes all decisions to act or not act along a given line. For animals "the definitions of the situations are implicit in the nature of the organism," whereas "on the social level these definitions and the patterns they initiate are represented by moral and legal codes, political policies, organizations, institutions, etc"

Although the expression *definition of the situation* is Professor Thomas's own creation the thought behind it is neither original nor controversial, but one of the accepted truisms on which sociology is based He merely states in somewhat obscure language that the human individual, though not acting instinctively as animals do, is nevertheless regulated in his behaviour by certain cultural forces Man's culturally determined lines of action differ from one culture to another Thus Professor Thomas demonstrates in a wealth of examples, showing the various ways in which different peoples *define the situation* with regard to such matters as the treatment of twins, behaviour towards relatives, sexual practices and the punishment of wrongdoers Practically all the anthropological data is given in the form of extensive extracts from many descriptive works on primitive peoples, and the reader who peruses it will acquire a large amount of information.

In spite of the mass of material which has been collected the book is disappointing The modern social anthropologist would consider that any *definition of the situation*—if this term is to be preferred—cannot be fully understood until seen as part of a working system whereby the individuals sharing a common culture co-operate to attain their common needs and desires But Professor Thomas does not appear to realize the importance of this either in the selection or in the presentation of his material

C M L.

Lady Barn House and the Work of W. H. Herford: By W. C. R. HICKS. (Manchester University Press, pp xiv+183. 7s. 6d.)

The first part of this book is an account of the life of W. H. Herford and of his introduction of the methods of Pestalozzi and Froebel into an English School When he opened Lady Barn House in 1873 for girls and boys under thirteen years of age Herford had already had some experience of teaching as tutor to the grandson of Lady Noel Byron and as Head of a School in Lancaster He had also studied for some years in Germany, and Mr. Hicks skilfully shows the blending of the influence of Herford's Unitarian upbringing with that of the educational theories of Froebel on his later work The History of Lady Barn House is given up to 1935, when its management was taken over by the University of Manchester

The second part gives Herford's Essay on " The School " and his notes on the teaching of various subjects In his exposition of his aims Herford lays continual stress on the necessity of " learning by doing " and protests against the prevalence of mere book learning in education His views on rewards and punishments, co-education, self-government, and the tyranny of examinations strike one as being extraordinarily modern, and, were they not coupled with the old Faculty Psychology, it would be difficult to realize that they were those of a nineteenth century schoolmaster

The account of the school is interesting, and the book is well compiled The reader will learn nothing that is new in educational method from it, but he will be struck by the extraordinary resemblance between the work of Herford in the second half of the nineteenth century and that of educational " experimenters " to-day

Year Book of Education: General Edition, 1937. (Evans Bros, pp. 911, 35s)

As announced by Sir Percy Nunn in the last Year Book, the size of this important annual has been somewhat reduced, by over one hundred pages The number and variety of subjects treated are still astonishingly great We think that the Chairman of the Editorial Board, Professor Clarke, in his introduction, rightly calls special attention to " a strikingly novel feature of the present volume," namely, that five of the papers on National Education (those on Russia, Italy, China, Bulgaria, and Hungary) have been " prepared and submitted officially by Governmental authority " The international nature of the Year Book is further indicated by the section on Education and the Social Crisis by Dr Schairer, by the section devoted to education in Islamic countries, Latin America, and the Far East, and by that which deals with the education of the adolescent in the Dominions and the United States of America Important problems nearer home occupy a large section under the heading " The Junior School of England and Wales," and " The ' C ' Pupil in Scotland," the section being introduced by Professor Hamley

In several ways the arrangement and general layout of the volume have been improved This makes its utility as a work of reference still greater In the production of a book giving such an enormous number of individual facts one can hardly expect the avoidance of all error, but the reviewer in a relatively brief perusal found some of the figures in Table 22 on page 38 very puzzling Thus the grand total of students for Bristol University is given as 132 more than that for Birmingham, though Bristol has over 500 fewer full time students and only exceeds Birmingham in the Extra Mural column, and that by half-a-dozen

Adjusting the School to the Child By CARLETON WASHBURNE (Harrap, pp xvi+189. 7s. 6d.)

Mr Washburne is Superintendent of Schools, Winnetka, Illinois, and in this book he has given a clear and detailed account of the work that is being done in those schools

The aim of this work in Winnetka is to adapt the schools to the individual differences of the children In order to do this a clear conception of the actual amount of knowledge the child must gain is worked out, and the child, with the help of carefully prepared apparatus and tests, is allowed to gain that knowledge at his own pace, regardless of the class he may be in. Half of each day is devoted to individual work and half to group activities, which include many kinds of craft work Criticism of methods by parents and others is frankly invited and seriously considered, and there is a complete absence of dogma in the enunciation of principles Suggestions for the individualizing of school subjects are given, and there are helpful references to American tests and educational publications

Some of the methods employed may strike the English teacher as being rather mechanical, and he may question whether a complete absence of competition is always conducive to progress But though he may not always find himself in agreement with the methods suggested, he will find the book both stimulating and interesting M C.P

A History of the Education of Young Children. By T. RAYMONT, M.A. (Longmans 7s 6d.)

This is a clearly arranged and interesting text-book dealing with the history of education of children between the ages of two and eight years from the beginning of the eighteenth century to the present day Although the author is concerned mainly with education in England references are made to developments in other countries, particularly when these have a marked influence on English practice

After a brief survey of the attitude to young children in the seventeenth century and the work of Comenius and Rousseau, the writer passes on to the contributions made by Owen, Buchanan and Wilderspin, Pestalozzi, Froebel, Dewey, Rachel and Margaret Macmillan and others The Revised Code and the various Education Acts of the period are considered with regard to their influence on the education of children under eight, and in a final chapter, entitled "Looking Forward," the importance of co operation between parents and teachers in order to promote the healthy and happy development of the child is stressed

The book contains a wealth of material in its 348 pages, and therefore the accounts of the individual pioneers are necessarily brief, but the author shows real skill in selecting the essential points of their lives and work and he estimates their relative contributions with great fairness and insight A useful bibliography is given at the end of each chapter M C P

Education and Modern Needs By J. H. NICHOLSON (Ivor Nicholson and Watson, pp. 224. 4s 6d)

A stimulating and original book by the Principal of University College, Hull The author has drawn on his wide knowledge of men and affairs for a picture of the contemporary European scene in its historical setting, and considers the function of education in relation thereto At the same time he suggests some illuminating comparisons between European and non-European cultures The result, while appealing particularly, as is the intention of the series in which it appears, to members of adult classes, is also of interest to the general reader, and to teachers. For the former there is a fascinating analysis of the forces—political, religious, economic and cultural, that have moulded and are moulding European society, and of the various educational policies and types of institution to which they have given rise So wide a survey—in time and in space—is refreshing For the teacher there is the practical outcome of all this the need for the schools consciously to orient themselves in relation to these forces, to evolve an educational policy adequate to the demands of leisure, of industry, of democratic citizenship , to cultivate personal and social ideals appropriate to a new society , above all to attack the neglected problem of training feeling as, in the past, only intellect has been trained This new challenge, which is at the same time a new mandate, should strengthen the hands and confirm the knees of many a wilting pedagogue M P

Individualizing Education by means of Applied Personnel Procedures. By J E WALTERS, Director of Personnel, Schools of Engineering, and Professor of Personnel Administration, Purdue University (London Chapman and Hall, Ltd, 1935, pp. xvi +278 12s 6d.)

This book has been written to present the methods of "individualizing education" by means of the applied personnel procedures and techniques of dealing with the student in college, high school, and grammar school

Part I is intended as a handbook for teachers and others who counsel the individual student about his personnel and personal adjustments Part II includes a description of a centralized personnel department or guidance bureau Part III describes personnel methods which have been used greatly in a centralized personnel programme but which can be employed by the individual teacher British readers unfamiliar with the extent to which personnel procedures have developed in America will no doubt find their main interest in the accounts of methods and in such explanatory devices as the samples of organization charts given in Chapter

IX, illustrating the detail and scope of the advice given to students in several colleges At the same time, while recognizing that in general the complicated organization described is unnecessary in this country, those concerned with students here will find many useful ideas for their own work, and they may wish that in our country we did not go to the other extreme in providing for our students a minimum of helpful advice in general and perhaps an excess in special cases when we can no longer ignore the necessity

Children Handicapped by Cerebral Palsy: By Elizabeth E. Lord, Ph D. (Commonwealth Fund, New York, 1937, pp. 105 $1.25. London: Humphrey Milford, Oxford University Press. 5s. 6d. net.)

The child who is handicapped by damage to the brain before or during birth is one of the most poignant tragedies of child life The failure of voluntary muscular control so often withholds the child from all the activities which should be the lot of every growing animal—the joy of play and freedom of movement—and not uncommonly masks the real degree of intelligence. Yet with patient persistence and understanding much may be accomplished, and with re-education of the muscles comes an improvement in the intellectual capacities which is surprising. Dr Elizabeth Lord has had an unrivalled opportunity of observing the progress and mental development of more than 300 children of this kind at the Children's Hospital, Boston, over a period of nine years

They present a very intricate educational problem Dr Lord finds that the Stanford Binet tests are not generally applicable and, indeed, often valueless, and that the only predictions as to general capacity that are of value must be made from observations and records covering a number of years Though perhaps the conclusions arrived at are general rather than specific, it is a useful study of a difficult problem

G A A

School Education in Hygiene and Sex: By G. O. Barber, M.B., Medical Officer, Felstead School. (W Heffer and Sons, Ltd., Cambridge, pp. 71 with 3 diagrams. 2s. 6d. net.)

The teaching of general hygiene, both theoretical and practical, is steadily gaining in importance in our schools. How much sex knowledge shall be given and how such instruction shall be directed are still vexed questions The matter of suitable approach has been the difficulty Many have felt that to deal with this matter separately tended to give the subject an undue importance. The plan adopted by Dr Barber and set forth in this booklet is admirable Five lectures are given, each dealing with one of the systems of the body and each lecture is short, lucid and practical The uro-genital system and reproduction thus come in for consideration at the end of the fifth lecture simply as necessary parts of the body mechanism A sixth lecture gives very sound instruction in the application to the needs and well-being of the individual of the knowledge imparted The last section deals with venereal disease and is intended for boys just before leaving school

This is quite the best approach to the subject that we have ever seen. The handling is rational and matter-of-fact without at any time becoming crude or too material While the book is specifically designed for boys from twelve to thirteen years of age, the scheme is sound and only simple alteration will serve to make it suitable for any age and both sexes

J R M.

Personality and the Family. By Hornell Hart and Ella B Hart. (D. C Heath and Co, pp. 345 8s. 6d.)

The first-mentioned author of this book is Professor of Social Ethics at Hartford Theological Seminary and the contents are a typical production of one of those more specialized chairs which one finds so much more frequently in the United States of America than in this country. The present study for example contains a good deal of purely sociological material briefly touching upon primitive life and giving somewhat fuller information about family and sex affairs in civilized communities

There are fuller particulars as to customs and ideas in the United States in recent years and the practical and ethical side of the exposition is indicated by some of the topics of the chapters, as for example, "When and whom *not* to marry," "Matching for successful marriage," "Finding a Mate," "Divorce," and "Understanding Parenthood." Sometimes authorities are quoted and their views apparently taken as correct without evidence being afforded It will be seen that the book covers a very wide range of problems connected with family and it certainly forms a good basis for discussion in the groups for which apparently it was primarily intended if one is to judge from the many "discussion points" given at the end of the chapters

Child Welfare outside the School: By MICHAEL KAYE (Oliver and Boyd, pp. viii+245. 6s)

A comprehensive and well-informed survey of the principal forces outside the school which, in this country, are helping to shape individual growth and character during the impressionable years, with indications as to what further developments of the same kind are to be desired or expected. The topics treated—the family, housing, poverty, health, leisure, employment and unemployment, delinquency, are considered from three aspects There is a survey of the existing facts, a sketch of recent legislation affecting them, and an indication of their significance for child development. The facts are corrected to 1934, the sources quoted are authoritative, and so useful that it seems a pity a systematic bibliography is not provided. The author's social philosophy is humane, balanced, idealistic Inevitably his discussion can take no account of developments since 1934—the new Factory Bill, or the raising of the school-leaving age, but his argument seems to anticipate them Less inevitably he seems to underestimate the importance and significance of the day continuation schools actually in existence and of the community centres already established on several of the new housing estates, the need for which he sees so clearly

The last chapter, a theoretic discussion of the relative spheres of state, local and individual action, and the relative merits of totalitarian and democratic forms of government, hardly seems part of the general pattern of the book. M P.

Statistics for Students of Psychology and Education: By H. SORENSON. (McGraw-Hill Publishing Co., Ltd., pp. viii+373. 21s.)

This book is designed primarily as a basic text for university and college students Emphasis has been placed upon interpretation, logical analysis, and the intelligent application of techniques, though not to the neglect of computational skills or the statistical techniques themselves

The topics are in the main those usually dealt with in a book of this kind, but the general exposition and explanations are clearer and more intelligible than is always the case Also the author aims not only at the development of good technical training in his readers, but also the development of "a wholesome skepticism, a critical attitude, and a keen quantitative sense in situations involving statistical data" To this end ways in which statistical methods have been misused are shown.

A large number of problems, questions, and exercises are provided at the end of each chapter, and the book can be highly recommended for use either as a reference book on statistical points, or as a text-book.

The Teaching of General Science: Issued by the Science Masters' Association. (London: John Murray, pp. 49. 2s 6d. net.)

This interim report of a sub-committee of the Science Masters' Association will be received with eager anticipation by all teachers of science in secondary schools The case for general science has been argued for many years and the discussion still goes on in many quarters to-day The writers of this report are to be complimented on their sane presentation of their case. The chapter on "The Aims of Science Teaching" is an illustration of this sanity and the student of psychology will be interested in the way in which the vexed question of transfer of training has been dealt with Excellent syllabuses are appended

The issue of this carefully-prepared report will do much to advance the claims of "general science" in secondary schools, will remove some of the stereotyped objections raised against these claims, and, it is hoped, will help to bring about a very desirable improvement in science teaching

The Teacher in the Making: By ALEX KENNEDY, M.A. (Oliver and Boyd, pp. xv+159. 3s. 6d)

Mr Kennedy has had wide experience both of teaching in schools and of the training of students He gives us the fruits of his experience in this very useful book. In the first part there is sound advice for the student in training and in the second for the young teacher No detail of class management or of teaching technique is ignored—the preparation of lessons, questioning and the utilization of answers, the use of the blackboard, the keeping of a record book, and the manner of the teacher to the class are all dealt with; the advice given is all practical, though the wealth of detail is such that the student will probably be unable to digest it all at once He will, however, find "The Teacher in the Making" invaluable as a reference book to which he can go for helpful suggestions when he is in difficulties, and the gradual assimilation of the advice given should greatly increase his efficiency as a teacher

Problems of Vocational Guidance: International Labour Office; Studies and Reports Series J (Education), No. 4, Geneva, 1935. (P. S. King and Son, Ltd., pp. iv+183. 5s)

The International Labour Conference having expressed a desire that the International Labour Office should prepare a general survey of the problems raised by the vocational training of young people, the Office began to collect the necessary documents, and soon found that an investigation of the problems of vocational training would be incomplete unless prefaced by a general study of vocational guidance This volume is therefore a preface to a further report to be published later, a report which will deal with the questions raised by vocational training proper

The present report is intended as a bird's eye view of the progress made by vocational guidance in different countries, and is an attempt to reconcile the educational, social and economic aspects of the problem

It is a most useful production, and invaluable to any serious student of vocational guidance and its problems It is a mine of well set out information, and particular questions can be studied in detail if use is made of the publications mentioned in the bibliography

Wayward Youth. By Dr AUGUST AICHHORN With a Foreword by SIGMUND FREUD. (London Putnam and Co., pp. 236+xi 10s. 6d. net.)

Dr Aichhorn explains the term "Wayward Youth" in the statement "By 'wayward youth' I do not mean merely delinquent and dissocial children but also so-called problem children and others suffering from neurotic symptoms" It is the aim of the author "to discuss the application of psycho-analysis to the treatment of delinquent youth" By training and very wide experience in clinical work in Austria he is excellently equipped for his task, and his book contains many case studies which add enormously to the value of the book Chapters are devoted to "The Analysis of a Symptom," "Causes of Delinquency," "The Training School," and "The Transference"

Teachers and social workers will find much of real interest in this volume, for it deals with an important aspect of the very complicated question of the relation between education and psycho-analytical work

A Borstal Experiment in Vocational Guidance: By ALEC RODGER Medical Research Council · Industrial Research Board Report No 78 (H.M Stationery Office, 1937, pp. 50 9d.)

This report describes an extremely interesting investigation carried out by a member of the staff of the Institute of Industrial Psychology on a request to the Medical Research Council by the Home Office at the instance of the Prison Commission The object was to try whether certain selected tests would be useful in allocating Borstal boys to their respective work-parties, and whether boys who were allotted a particular kind of work on the recommendation of the psychologist were more successful in that work than boys not so recommended It is enough to say that since the report was written the Prison Commissioners have arranged with the National Institute of Industrial Psychology that instruction in the use of the methods employed in the investigation be given to Borstal house-masters, and several of them have already received such training

The Dangers of Being Human By EDWARD GLOVER. (Allen and Unwin, pp 206. 5s)

This book, consisting of a series of broadcast talks with some modifications, is classed by its author as "popular science" Dr Glover's object is to apply to broad social phenomena the conclusions of psycho-analysis He seeks to show by illustrations drawn from modern politics, war, etc, that our actions are in the main determined by an irrational mental structure similar to that of the savage His remedy is a less repressive educational system which may relieve our children of some of their unconscious fears In so short a book, the argument is bound to be rather sketchy, but the distinction between acknowledged fact and disputable hypothesis might have been more plainly made There is a foreword by Dean Inge, and two appendices in which the author criticizes the League of Nations and discusses the employment of the vote without reference to psycho-analysis

C H W

Standards for the Evaluation of School Buildings · By T C HOLY AND W. E. ARNOLD. (Published by the Bureau of Educational Research, Ohio State University, pp 79. $1, Score Card separately, 10 cents.)

This book gives in a form that is readily accessible the desiderata in buildings and equipment of elementary, junior high, and senior high schools

The main thesis of the book is that the design of school buildings and furniture must be determined by function The authors recommend that, in order to secure flexibility, buildings should be of unit construction and the furniture should be movable

In the appendix to the book there are two score cards (one for elementary school buildings and one for junior and senior high school buildings) by which the accommodation in any given school can be assessed on a 5-point scale These two score cards are obtainable separately at a cost of 10 cents each

W J D

The Teaching of Science By W L SUMNER (Oxford Basil Blackwell, pp. 208 3s. 6d. net.)

The title of this useful little book is rather misleading There is a very great need for a comprehensive book on this subject and one hoped that the author had attempted to meet this requirement. But hopes were not realized The volume is a short survey of science teaching in post-primary schools, but essentially it is a teacher's book for use with the well-known books by Professor Andrade and Julian Huxley, "Simple Science" and "More Simple Science" The chapters dealing with the survey are interesting but brief, superficial but suggestive Teachers in post-primary schools will find help in adapting the work in the two books to which this is a companion volume to their own particular needs A very desirable humanistic atmosphere pervades the whole, and the book ends with a very useful list of books suitable for a school science library.

The Gateway of Speech: By FREDA PARSONS. (London: Ginn and Co., Ltd., pp. 240. 7s. 6d. net.)

Also *Rhyme Book One*, 1s. 6d.; *Rhyme Book Two*, 1s. 6d.; *Rhyme Book Three*, 1s. 9d.: By FREDA PARSONS.

The work of Miss Freda Parsons in connection with remedial speech training in Birmingham and other cities is so well known for its remarkable success that many people will be glad that she has published these books in response to numerous requests from teachers and doctors. Her work bears the stamp of the enthusiastic pioneer; her methods are very carefully and scientifically developed; her exercises arouse keen interest among her subjects. She has succeeded in carrying this enthusiasm over into her books, which are delightfully illustrated.

Sociology: By MORRIS GINSBERG, (Home University Library, Thornton Butterworth, pp. 255, 2s. 6d.)

This makes an admirable introduction to the subject. The exposition is extremely lucid and interesting, and so far as psychology is introduced, more particularly in Chapter 4, "The Psychological Basis of Social Life," it seems sound,

VOLUME VII NOVEMBER 1937. PART 3.

THE RELATION OF INTELLIGENCE TO VARYING BIRTH-RATE IN DIFFERENT SOCIAL GRADES.

BY E. J. G. BRADFORD.

I.—*Introductory.*
II.—*The evidence, experimental and statistical.*
  (*A*)—*The populations sampled.*
    (1) *Mean intelligence.*
    (2) *Occupational composition.*
    (3) *Intelligence of occupational groups.*
  (*B*) *The incidence of differential fertility.*
    (1) *The relation of fertility to intelligence and occupation.*
    (2) *Estimates of the effect upon the population as a whole*
III.—*Conclusions.*

Appendix (I) *Note on the London data*
  (II) *Note on the grouping of the data.*
  (III) *Note on the Devon data.*
  (IV) *Estimation of mean intelligence from occupational composition.*

I.—INTRODUCTORY.

DURING the last fifteen years the results of a number of investigations have been published which seem to indicate that the rate of increase in the British population is greatest among those groups the children of which make on the average lower scores at intelligence tests It is the purpose of this article to show how far these results may be regarded as mutually confirmatory, even though the conclusions drawn from them by the different investigators be superficially (and guardedly) contradictory. Some see evidence of the effect of environment while others regard that same evidence as showing the effect of heredity. Thus, environmentalists " do not assert that the level of human intelligence can be indefinitely raised by successive improvements in the standard of living "[1] and " . . . the exponents of ' Nature '—mainly scientists—never dreamt of denying that suitable environment was necessary for the development of hereditary qualities."[2] " In the environment *v.* heredity controversy the verdict of the psychologist on the psychological field is, in a word, that mental capacity is inherited, but that character, emotional reactions, habits and skills are largely matters of environment."[1]

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[1] GRAY, J. L . *The Nation's Inheritance*, p. 115.
[2] CATTELL, R. B *The Fight for our National Intelligence*, p. 36.

Although the problem as to the effect which the differential fertility may have upon the mean level of intelligence of the population dates back to Galton, relevant large scale investigations may be said to begin with Duff and Thomson[2] in England, and with Haggerty and Nash[3] in America. Both these researches showed that the children drawn from the different occupational groups varied in average intelligence. It was next shown[4] that children drawn from large families gained lower intelligence test scores than those drawn from small families. Sutherland and Thomson[5] examined the effect of position in family and of unfinished families upon the measure of intensity of the inverse relationship between intelligence and size of family. Gray and Moshinsky[6] confirmed the existence of differences of average ability corresponding with occupational groups, but the authors drew attention to the very wide range of ability within each group, and stressed the possibility that success in an intelligence test, expressed entirely in words, might be affected by upbringing. Working with tests predominantly pictorial in character Cattell[7] confirmed the inverse relationship between intelligence and size of family, and furnished further evidence of the different mean intelligence of occupational groups

The Census return for 1921 published under the title " Dependency, Orphanhood, and Fertility," gave tables showing that the size of the family varies with the father's occupational group The groups with the larger families are just those which several investigations have shown to produce proportionally more children with low intelligence. That the phenomenon still persisted in 1934 was shown in the Merseyside survey.[8]

In so far as fertility is affected by occupational class tradition the rate of lowering of the average intelligence will depend upon the proportion of the total population in each occupational group. In so far as fertility is directly related to intelligence, the decline is likely to be more rapid for all classes will be affected ; and if there be an equally wide variation of intelligence in each of the occupational groups the decline will be further accelerated, unless there is also a very wide difference in the mean intelligence of the different groups. Hence the distribution of occupations within the total population, the distribution of intelligence within the occupational group, and the difference in mean intelligence among the groups are three lines of enquiry which need to be pushed forward before the likelihood of any change in the average intelligence of the population can be confidently prophesied or an estimate of its magnitude offered.

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[1] CATTELL, R B. : *The Fight for our National Intelligence*, p 35.
[2] DUFF AND THOMSON *British Journal of Psychology*, Vol. XIV. 1923
[3] HAGGERTY AND NASH : *Journal of Educational Psychology*, Vol XV.
[4] BRADFORD · *Forum of Education*, Vol III. 1925
[5] SUTHERLAND AND THOMSON ; *British Journal of Psychology*, Vol XVII
[6] GRAY AND MOSHINSKY *Sociological Review*, Vol XXVII, 1935.
[7] CATTELL *The Fight for our National Intelligence*, 1937.
[8] CARADOG JONES . *Eugenics Review*, July, 1936

II.—THE EVIDENCE, EXPERIMENTAL AND STATISTICAL.

(A) *The populations sampled*

(1) *The mean intelligence*

Considerable divergence both in the mean intelligence and in the range of intelligence is to be noted among the results of the different investigations. Such differences challenge interpretation and several have been offered, such as the type of test used, the drift of intelligence to the towns, and practice in answering intelligence tests

TABLE I.

VARIATIONS IN MEAN INTELLIGENCE.

Locality	*Mean I Q.*	*S D*
Northumberland County . ..	99 6	14 2
London	[1]117·6	36 0
Leicester City	100 9	21·9
Devon County	93·5	36·9
Scotland	100·0	16·5
Halifax	101 8	—

(2) *The Occupational Composition of the Populations.*

The distribution of the population among the occupational groups varies considerably from locality to locality (see Table II) and this may have the effect of producing variations in the mean and in the range of intelligence of samples drawn from these localities. From the point of view of occupational composition none of the samples are reasonably representative of the total population, except possibly that from Scotland

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[1] GRAY *Sociological Review*, April, 1935, 50 percentile is given as 113·3 on p. 137. Mean of distribution on p. 138 is 115·5. S.D. 22·7 See Appendix I

TABLE II.

THE PERCENTAGE OCCUPATIONAL COMPOSITION OF THE POPULATIONS.

Locality	*Labouring* [1]	*Skilled*	*Clerical*	*Professional*
Northumberland . .	57	25	15	3
London	20	41½	33½	4½
Leicester	16	57	25	2½
Devon County . ..	53½	25½	17	3½
Halifax	24½	50½	22	3
Scotland	38½	37½	19¼	3¾
Sheffield	28	50	20	2¾
England and Wales ..	35	37½	23½	3½

It has been shown (Table III) that a difference of mean intelligence exists between the children drawn from these occupational groups, hence a variation in the proportion of the population engaged in the different occupations must influence differentially both the mean and the range of intelligence of the populations sampled.

(3) *The Intelligence of the Occupational Groups.*

TABLE III

MEAN INTELLIGENCE OF OCCUPATIONAL GROUPS.

Locality	*Labouring.*	*Skilled*	*Clerical*	*Professional.*
Northumberland	97·5	99·5	107·0	112·0
London	111	117	123	131
Leicester (Adults) ..	82	103	124	142

A wider range of means for adults than for children is to be expected, since both parents are not drawn from the same occupational group, nor are they necessarily of the same grade of intelligence. A regression of the mean for children away from the occupational mean towards the mean of the total population is to be expected. Differences in the form of the tests and in standardization probably account for the very high mean I.Q.'s obtained in the London investigation. A check on the accuracy of this basic standard can be obtained by weighting the occupational mean I.Q.'s in proportion to the fraction of the population engaged in that occupation and then summing. The result should give approximately 100, as by definition the mean I.Q. of the population is 100.

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[1] See Appendix II.

TABLE IV.

WEIGHTED I Q VALUES.

England and Wales	*Fraction per cent*	*Mean I Q Gray*	*Weighted I.Q. per cent.*	*Mean I Q. Cattell*	*Weighted I Q per cent.*	*Mean I.Q Duff.*	*Weighted I Q per cent*
Professional	3·5	131	4·6	142	5·0	112	3·9
Clerical . . .	23·5	123	29	124	29 2	107	25 2
Skilled .	37·5	117	44	103	38 5	99 5	37·3
Labouring.	35	111	39	82	28·7	97·5	34·1
Mean I Q. . .	—	—	116 6	—	101·4	—	100 5

From Table IV it will be gathered that the mean of the London results is 16 points too high, and that of Leicester about one point too high When the means given in Table IV are adjusted accordingly, it is the agreement rather than the disagreement between the London and Northumberland results that is obvious.

TABLE V

THE ADJUSTED MEAN INTELLIGENCE OF THE OCCUPATIONAL GROUPS.

Locality	*Labouring*	*Skilled.*	*Clerical*	*Professional*
Northumberland . .	97·5	99 5	107	112
London	95	101	107	115
Leicester (adults)	81	102	123	141
Leicester (50% regression) . .	90·5	101	111 5	120·5

The interval between the mean I.Q of the occupational grades is over 5 points and with more discriminating tests it may well approach the 10 point interval suggested by the Leicester results, the means of which are not only more widely spaced, but more evenly spaced also.

It should be expected that a population composed of a majority of skilled workers, or of clerical workers, will show a higher mean I.Q than one composed predominantly of labourers. With commendable patriotism the report on the Scottish survey[1] devotes some six pages to a research into other reasons to account for the higher mean intelligence disclosed in the Halifax sample. Proportionately Scotland has 50 per cent fewer skilled workers and 30 per cent more labourers than Halifax

The difference between the mean I.Q. of the rural and urban populations can also be accounted for along similar lines. Both in Scotland and in England the mean intelligence of the urban population is higher than that of the rural (see Table VI).

TABLE VI.

THE DISTRIBUTION OF INTELLIGENCE IN URBAN AND RURAL LOCALITIES.

Locality		*I Q.* *under* 70	70–89	90–109	110–129	130–
Scotland	Cities	0	20 4	47·5	25 3	6·8
	Counties	0·9	27·8	43·3	22 3	5·6
England	Leicester	4 2	27·1	42·0	16·9	10 0
	Devon	7·0	40·2	38 5	8 6	5·9

In both cases there is a wider range of intelligence in the rural than in the urban populations. Owing to the much greater variation shown in the Leicester and Devon[2] results, the standard deviations for which are given as 21·9 and 36·9 respectively, no useful comparison can be made with the Scottish data, the standard deviations of which are approximately 16·7 and 17·5 respectively. The correspondence between the occupational distribution and the distribution of I.Q.'s for Leicester and Devon is however very suggestive.

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[1] *The Intelligence of Scottish Children*, pp. 72-78. Also see Appendix IV.
[2] See Appendix III.

TABLE VII

CORRESPONDENCE OF OCCUPATIONAL CLASSES AND INTELLIGENCE GRADES.

Leicester		*Devon*	
I Q under 90 31·3%	Labouring 16%	I Q under 90 47·2%	Labouring 53½%
I Q 90–109 42·0%	Skilled 57%	I Q 90–109 38 5%	Skilled 25½%
I.Q 110 over. 26·9%	Non-manual. 27½%	I.Q 110 over. 15·5%	Non-manual. 20½%

There is undoubtedly a very wide variation of intelligence within each occupational group, but the extent of the variation discovered differs from one investigation to another. It is of course possible that social and economic forces may reduce the extent of variation within the group in the course of time. The provision of comparable educational facilities for all may cause individuals of different intellectual grade to gravitate to the occupational class best suited to their ability.

TABLE VIII.

THE RANGE OF ABILITY WITHIN THE OCCUPATIONAL GROUPS

Occupation.	*Investigation.*	*Approximate 25 percentile*	*Adjusted Mean*	*Approximate 75 percentile.*
Professional .. .	D. and T.	102	112	121
	G and M	99	115	137[1]
Clerical . ..	D. and T	97	107	116
	G. and M.	79	107	143[1]
Skilled....	D. and T	92·5	99·5	110·5
	G and M.	79	101	123[1]
Labouring . ..	D and T	88·5	97·5	106·5
	G and M.	78	95	113[1]

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[1] The values given in the 75 percentile column for G and M. agree fairly well with the results given in Table VII, p. 314 of the *Sociological Review*, July, 1935, if a 16 point adjustment be made.

Taking an I.Q. of 140 as the standard of really high ability Duff and Thomson discover about 0·1 per cent in the Northumberland sample; Gray and Moshinsky find more than 25 per cent in the London sample; Cattell finds 6 per cent in Leicester and 3½ per cent in rural Devon. Further research may indicate which of these estimates is the more accurate, and whether the differences between the localities are as great as these figures imply.

The range of ability among the adults tested by Cattell is naturally much narrower than it would be for the children of those same adults The sample of adults is unfortunately small, in each broad group there are from 170 to 240, except for the Labouring group, in which only 31 are included.

TABLE IX.

THE RANGE OF ABILITY AMONG ADULTS.

Occupation	*Approximate 25 percentile.*	*Adjusted Mean.*	*Approximate 75 percentile.*
Professional	131	141	150.
Clerical	111	123	133
Skilled	86	102	115
Labouring	68	81	94

The difference in range of ability, as found by both Gray and Cattell within the sampled populations, corresponds with the difference in range found within the occupational groups. This difference in range is of considerable interest since it forms the basis of the opposing points of view expressed by Gray and Cattell. The former advocates an accelerated development of educational facilities to ensure that the enormous potential ability of the nation shall be made available for social and material progress. He suggests that the reservoir of ability is so great that the relatively small loss due to the dysgenic influence of differential fertility can be disregarded, at least for some years to come. The latter views with dismay the influence of that same dysgenic factor as it steadily drains away the nation's already impoverished reserve of superior intelligence.

(B) *The incidence of differential fertility.*

(1) *Differential fertility in relation to intelligence and occupation*

The fall in the birth-rate during the last sixty years has not been uniform among the occupational groups. The non-manual groups exhibited the trend first and more recently the fall has been noted among the skilled craftsmen and to a lesser extent in the labouring group The fall is most marked in the non-manual groups and least in the labouring group. The higher the mean intelligence of the broad group the lower is its birth-rate, though this is not necessarily true of the sub-groups

As the birth-rate of the non-manual groups is not sufficient to maintain their numbers there is a loss of the more intelligent stock both relatively and absolutely. Similarly the birth-rate in the labouring group is, in spite of the higher death-rate, sufficient to increase both relatively and absolutely the numbers of the less intelligence stock To the extent that intelligence is hereditary the mean intelligence of the population will fall. To the extent that differences in mean intelligence between the occupational groups is the result of a differing environment only, a change in the standard of living is likely to produce a change in the mean intelligence of the nation.

It has been shown however that the size of family not only corresponds roughly with the occupational group, but also with the intelligence of the children irrespective of the group from which they are drawn At present there is no evidence regarding the relation of size of family to the intelligence of the child within each occupational group The " wastage " of intelligence will be more rapid if the lowest birth-rate of each occupational group is found among its more intelligent members, than if the birth-rate is tolerably uniform within the occupational group, and only those members who pass to the next group above to replace the wastage in that group have a mean birth-rate lower than that of the group from which they moved

(2) *Estimates of the effect of differential fertility upon the population as a whole*

Two attempts have been made to estimate the rate of decline of mean intelligence, assuming that intelligence is hereditary The method adopted was to weight the numbers in each grade of intelligence with a factor of increase or decrease corresponding to the differential birth-rate In the first attempt[1] the frequencies in the intelligence grades were weighted with a differential factor corresponding to the relative rates of increase found among the occupational groups, it being assumed that because the more intelligent children were drawn from the smaller families they were therefore drawn predominantly from the occupational groups with the smaller families. The second attempt[2] was an improvement in that the frequencies in the intelligence grades were weighted in proportion to the mean size of family for that intelligence grade.

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[1] BRADFORD *Forum of Education*, Vol III, 1925.

[2] CATTELL *The Fight for our National Intelligence.*

There is fairly close agreement regarding the mean size of family from which each grade of intelligence is drawn. The samples of the school populations from Sheffield, Isle of Wight, Leicester and South Devon indicate that the mean size of family of the lowest 20 per cent in intelligence is about 4·5, of the next 40 per cent above, about 4·0, and of the top 10 per cent probably well under 3·0. The apparent disagreement at the top end of the different samples is almost certainly due to selection. The Isle of Wight[1] sample contains no representatives from the schools for fee payers, and has also been "skimmed" by means of a scholarship examination. The Sheffield sample is unskimmed, but is drawn entirely from representative elementary schools in the city. The mean size of family in the top 5 per cent of the Sheffield sample is 1·7, but the number of cases (19) is too small for the average to be relied upon.

TABLE X.

THE MEAN SIZE OF FAMILY FOR DIFFERING GRADES OF INTELLIGENCE.

I.Q	*Sheffield.*		*Isle of Wight.*		*Leicester.*		*South Devon.*	
	Per cent of Sample	*Mean Family.*	*Per cent of Sample*	*Mean Family.*	*Per cent of Sample*	*Mean Family*	*Per cent of Sample.*	*Mean Family.*
High	24	2·9	8	3·6	6	2·7	3	2·2
	25	4·0	25	4·0	30	3·0	16	3·27
	30	4·45	40	4·6	41	3·6	47	3·72
Low	21	4·85	27	4·7	14	4·1	19	4·3

If the data in Table X be taken as a fair indication of the relative rate of increase of the different grades of intelligence within the population as a whole, then an estimate can be made of the change from generation to generation in the distribution of intelligence in the total population (see Table XI).

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[1] SUTHERLAND AND THOMSON *British Journal of Psychology*, Vol. XVII

TABLE XI

THE DECLINE IN MEAN INTELLIGENCE PER GENERATION

I.Q.	*Percentage Distribution*				*Relative Rate of Increase*
	To-day	*First Generation*	*Second Generation*	*Third Generation.*	
High	10	7·8	6·0	4·5	3
	30	27·3	24 5	21 7	3½
	40	41·5	42 5	43·0	4
Low	20	23·3	27 0	31 0	4½

Differential fertility among the occupational classes is a well-established phenomenon According to the Census returns for 1921 the professional classes had 1·5 children per family, the clerical and commercial 1·6, skilled workmen 2·0, labourers 2·4 Even if these numbers are low owing to the inclusion of the war years in the period of the potential growth of these families, the relative rates of reproduction are about the same. In 1921 the births per thousand men under 55 were non-manual workers 98, skilled artisans 134, unskilled workers 178. The Merseyside survey records an average family of less than three for clerical workers (under £5 per week class), four for skilled workers, and over five for the unskilled.

It will be noted that the average size of family for the lowest grade of intellect is smaller than the average size of family for the lowest grade worker. This comes about because a number of the lower intellects are found among the smaller families of the other types of worker. Similarly the average size of family of the professional class is smaller than the average size of family supplying intellects of the highest order, because such intellects are occasionally found in the larger families of the manual workers.

By combining the relative fertility of the occupational classes with the relative fertility of the different grades of intelligence (see Tables XII and XIII) an estimate of the rates of increase within the occupational groups is obtained. The accuracy of this estimate will need to be checked by further investigation. The indication is that the more intelligent members of each occupational group have on the average the smaller families.

TABLE XII.

ESTIMATED SIZE OF FAMILY WITHIN THE OCCUPATIONAL CLASSES

Occupational Class	*Grade of Intelligence*				
		Lowest 20 *per cent*	40 *per cent.*	30 *per cent.*	*Highest* 10 *per cent.*
	Size of Family	4½	4	3½	3
Labouring.	5	4 75[1]	4 48	4 18	3 88
Skilled	4	4·48	4 0	3·72	3·46
Clerical	3	3·72	3·46	3·24	3 0
Professional	2	3 0	2 83	2·65	2 45

It is generally accepted that to maintain the numbers in the total population an average family of approximately 3·25 is necessary Taking this figure as unity the relative rates of increase and decrease can be expressed according to occupation and intelligence as in Table XIII

TABLE XIII.

ESTIMATED RATES OF INCREASE WITHIN THE OCCUPATIONAL CLASSES

Occupational Class	*Grade of Intelligence*				*Percentage of Total Population*
	Lowest 20 *per cent*	40 *per cent.*	30 *per cent*	*Highest* 10 *per cent*	
Labouring	1·47	1 38	1 3	1·2	35·0
Skilled....	1·38	1·23	1·15	1·08	37·5
Clerical	1·15	1·07	1·0	0·93	23 5
Professional . . .	0 93	0·87	0·82	0 76	3 5

The reservoir of high intelligence is to be found among the manual workers, while the wastage occurs in the ranks of the non-manual classes. According to Duff and Thomson the top 6½ per cent of the population is composed of 15 3 per cent of brain workers and 5·1 per cent of hand workers. The top 23·5 per cent has in it 43·5 per cent of brain workers and 20·5 per cent of the hand workers. Interpolating between these two limits, the top 10 per cent of the total population is estimated to contain 22 per cent of the brain workers and 9 per cent of the hand workers. From the previous table it will be seen that the mean rate of increase of the hand workers in the top 10 per cent of the population is 1·14, while the rate of decrease among the brain workers in the top 10 per cent is 0·9. In the total population 72·5 per cent are hand workers and 27 per cent are brain workers. Thus (9×72·5) or 6·5 per cent of the total population will increase in one generation to (6·5×1·14) or 7·4 per cent, while (22×27) or 5·95 per cent will decrease to (5·95×0·9) or 5·4 per cent. The gain is 0·9 per cent and the loss 0·55 per cent. By a similar calculation the 5 per cent of brain workers and the 21 per cent of hand workers at the other end of the scale increase respectively by 0·19 per cent and 6·4 per cent respectively.

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[1] Geometric mean of the mean family for each intelligence grade and the mean family for each occupational class.

Thus in one generation there will be a net gain of 0·35 per cent at the top end of the scale, while during the same period the gain at the bottom end is 6·59 per cent. The general effect of such increases is that there will be a drop in the average intelligence of the population taken as a whole. Cattell's results suggest that the overlap of the distribution of intelligence of the occupational classes is much less than that recorded by Duff and Thomson, upon which the above calculations are based. Gray's results suggest that the overlap is much greater. Hence further evidence on this point is required before the existence of, the direction of, or the extent of a change in the average intelligence of the population can be predicted with any degree of certainty.

III.—CONCLUSIONS.

The results of investigations up to date seem to indicate that, so far as the British population is concerned, relationships exist between, (*a*) the size of family and the intelligence test scores of sample members from those families, (*b*) the intelligence test scores and the occupation of the parent, (*c*) the size of family and the occupation of the parent, (*d*) the mean fertility of the occupational class and the mean intelligence of the children of that class. The relationships (*a*) and (*d*) are of an inverse type.

It is *probable* that intelligence varies inversely as fertility within the occupational group. In so far as the test score is a measure of a hereditary quality, differential fertility of the present order must lead to a lowering of the mean intelligence of the population taken as a whole.

APPENDIX I.

Note on the London data

The mean intelligence of the London sample has been calculated from the most numerous groups in each occupational class. The data have been extracted from Table V, p. 305 ff. of the *Sociological Review* of July, 1935. The standard deviations given with the mean I.Q. of each larger group of occupations cannot be used to calculate the standard deviation of the distribution of raw scores because it represents only the variation among the means of the sub-groups included in the larger group. The larger the number of sub-groups the smaller does the standard deviation become. Thus

	Mean I.Q.	*S.D.*	*Class*	*Number*	*Sub-groups Table IV.*
Skilled (All) ..	117·6	0·68	E (1)	2367	25
Small Owners ..	117·2	3·19	A (2)	135	4

The largest sub-group of Smaller Owners, "Number of employees not stated," has 93 representatives with a mean of 114·4, S.D. 3·53, giving a S.D. for the distribution of raw scores of approximately 34·0. To divide the S.D. of the mean of the sub-group means by the square root of 4, when one of the four sub-groups contains 2, and another only 3 representatives, as against 36 and 93 in the other sub-groups, gives quite a fictitious value to the measure of variation.

For the purpose of estimating the means of the total population sampled and of the four broad occupational classes the data extracted from Table V was as follows.

Professional.	All teachers, doctors, ministers, lawyers, civil servants (customs, administrative and various)	Number 741
Clerical and Commercial	Clerical (inferior and superior) owners (employees not stated), shop assistants, shopkeepers (assistants not stated), commercial travellers, managers, commercial and industrial	Number 1617
Skilled Workers	Building, bus and tram conductors and drivers, railway skilled and miscellaneous, electricians, engineers, motor and taxi, factory workers, metal and furniture trades	Number 1757
Labouring	Packers, carmen, dustmen, unskilled factory, building labourers, navvies, general labourers.	Number 777

That the above gives a fair selection of the whole sample can be gathered from a comparison of the means.

	Table V	*Selected Classes*
Professional	134·5	131
Clerical and Commercial	127·3	123
Skilled	117·6	117
Unskilled	112·3	111

APPENDIX II

Note on the grouping of the data.

The data from Duff and Thomson's article in the *British Journal of Psychology* was taken from p. 193 ff. and grouped as follows.

Professional	Classes A and B	Number 239
Clerical and Commercial	Classes C and E	Number 1116
Skilled	Classes F, G, H, I and J	Number 2836
Labouring	Classes K, L and M	Number 8310

The occupational means from Cattell's data were taken from Diagram V on p. 62. The grouping was as follows

Professional,	Teachers, doctors, civil and (highest grade) mechanical engineers	Number 233
Clerical and Commercial	Managers, typists, clerks, commercial travellers, telephonists, shop assistants	Number 195
Skilled	Precision fitters, coach builders and trimmers, carpenters, cabinet makers, machine operators	Number 174
Labouring	Packers and welders	Number 31

The occupational classes given in the 1931 Census returns were grouped as follows

Professional	[1]XXIV, XXV.
Clerical and Commercial..	XIV, XVII, XXIII, XXVII, XXVIII.
Skilled, ...	V, VII to XIII, XV, XVI, XX, XXI, XXII, XXIX, XXX.
Labouring..	I, II, III, IV, VI, XVIII, XIX, XXXI.

APPENDIX III.

Note on the Devon data

The contrast between the average intelligence of urban Leicester and rural Devon is unfortunately exaggerated by the omission from the Devon sample of representative children from the private and preparatory schools in the rural area. In the preparatory schools recognized by the Board of Education in the area samples, there are nearly 150 day boys, there must be many girls, and quite a number of children from within the area who are boarders, possibly weekly. A considerable fraction of the population is within easy travelling distance of Plymouth, where there is a public school for boys, which takes day pupils More than 10 per cent of the Leicester sample are drawn from public and preparatory schools. A selection of pupils from country Grammar Schools does not sample the same social grade. In any case, the rural sample includes in proportion nearly twice as many elementary school children as the urban, this alone needs some justification, before the sampling can be regarded as fair

APPENDIX IV.

Estimation of mean intelligence from occupational composition.

The effect which the occupational composition of a sample may have upon the average intelligence of that sample can be illustrated by distributing the numbers in each occupational group about the mean intelligence of that group.

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[1] The defence forces are omitted from Class XXIV

Assume that the four main occupational classes differ in mean intelligence to the extent of 10 points of I.Q. and that the variation about that mean is uniform for all the classes and approximates to the proportions of 1 4 6 · 24, 30. 24 : 6. 4 : 1 then a hypothetical distribution of intelligence in the population of Scotland (and Halifax) can be made as below.

OCCUPATIONAL GROUPS DISTRIBUTED ACCORDING TO GRADE OF INTELLIGENCE.

Occupation	*Per cent*	*I Q 55*	*I Q 65*	*I Q. 75*	*I Q 85*	*I Q 95*	*I Q 105*	*I.Q. 115*	*I Q 125*	*I Q 135*	*I.Q 145*	*I.Q 155*
Professional .	3½					0 1	0·2	0 9	1 1	0·9	0·2	0·1
Clerical .	19½			0·2	0·8	1·2	4·6	5 8	4 6	1·2	0 8	0·2
Skilled ...	37½		0 4	1·5	2·3	9·0	11·2	9·0	2·3	1·5	0 4	
Labouring ...	38½	0 4	1·6	2·3	9·2	11·5	9 2	2·3	1·6	0·4		
Total. ..		0 4	2 0	4·0	12·3	21·8	25·2	18·0	9 6	4·0	1 4	0·3

Mean 101 6, S D 17·1.
By a similar calculation the Halifax values arrived at are. Mean 105·3, S D 16 0

The difference between the means as estimated for Scotland and Halifax is a little greater than that found by testing because the occupational means are really not quite 10 points apart.

RÉSUMÉ

DE L'ABAISSEMENT DE L'INTELLIGENCE AVEC L'AUGMENTATION DU NOMBRE DES NAISSANCES, CHEZ DES RANGS SOCIAUX DIVERS.

Dans cet article l'auteur s'efforce de démontrer que les résultats de plusieurs enquêtes depuis celle de Duff et Thomson en 1923 jusqu'à celle de Cattell en 1936 s'accordent en tant qu'elles indiquent un rapport entre l'intelligence des enfants et, dans l'un des cas, le métier du père, dans l'autre, le nombre des enfants Il y a aussi du témoignage statistique pour démontrer qu'il existe un rapport entre le métier du père et le nombre des enfants En général les familles moins intelligentes sont plus nombreuses que les plus intelligentes et ceci, avec le temps, mènera à un abaissement de la moyenne de l'intelligence de la population.

ZUSAMMENFASSUNG

DAS VERHÄLTNIS ZWISCHEN DER INTELLIGENZ UND DEN GEBURTSZIFFERN DER VERSCHIEDENEN GESELLSCHAFTLICHEN SCHICHTEN.

In diesem Aufsatz versucht der Verfasser zu zeigen, daß die Ergebnisse mehrerer Untersuchungen von Duff und Thomson 1923 bis Cattell 1936 insoweit übereinstimmen, wie sie eine Verbindung zeigen von der vererbten Begabung mit dem Beruf des Vaters und mit der Grösse der Familie. Es gibt auch einen statistischen Beweis, dass eine Verbindung zwischen dem Beruf des Vaters und der Grösse seiner Familie besteht. Im allgemeinen sind die weniger intelligenten Familien grösser als die intelligenteren. Das wird mit der Zeit zu einer Verminderung der Durchschnittsbegabung führen.

BRILLIANT CHILDREN:
WITH SPECIAL REFERENCE TO THEIR PARTICULAR DIFFICULTIES.*

BY E. MILDRED NEVILL.

I.—*Background and data.*

II.—*General findings relative to the discussion.*
- *Clarity of thought.*
- *Language development.*
- *Attitude to tests.*
- *Characteristics which may hinder*
- *Signs of precocity.*
- *Abilities other than general intelligence.*

III.—*The 'difficult' group.*
- *Signs of maladjustment.*
- *Outstanding difficulties which made adjustment necessary.*
  - (*a*) *Scholastic.*
  - (*b*) *Social.*
  - (*c*) *Personal.*
  - (*d*) *Lying and stealing.*
  - (*e*) *Serious neurotic cases.*
- *Drawbacks with which gifted children have to contend.*

IV.—*The possibility of adjustment.*

V.—*Summary.*

I.—BACKGROUND AND DATA.

THE material for this paper has been collected from the cases brought to the Psychological Centre for School and Home during its first three and a half years' work. All the children have been tested by the writer or her partner, Miss Hilda Bristol. Owing to the fact that the Centre is in the nature of a private practice it has not been possible to collect as much data about all the children as might have been wished. Some have only been seen once, although others are in schools where their progress is being carefully watched and more detailed study is possible.

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* Based on a paper given before the Educational Section of the British Psychological Society, November, 1936

The large proportion of specially gifted children (with I Q.'s of 140 and over) brought to the Centre has been striking—about 12 per cent out of 800. This study has been restricted to the seventy-eight of those who have been given the Binet-Simon Tests up to date Those who were given other tests, because they were either too young or too old for a satisfactory Binet score, have been excluded Nearly all the children come from cultural homes and are attending private, secondary or public schools. Only four of them were in elementary schools at the date of testing. Whenever opportunity offered they were given supplementary tests The numbers included at the different age levels are as follows, 3-1, 4-4, 5-9, 6-14, 7-9, 8-8, 9-12, 10-8, 11-11, 13-2 Table I shows the distribution of these children having I Q.'s ranging from 140-180.

TABLE I.

This table shows the total number of boys and girls included in this study at the different I Q. levels, ranging from 180 to 140 The numbers in brackets are the number labels of the individual children When individual children are mentioned in the paper it is possible, by reference to the bracketed numbers, to discover their approximate I Q For instance, G7 has an I Q somewhere between 160 and 164, and B7 between 155 and 159

Binet I Q	*Boys.*	*Girls*
180	1 (1)	1 (1)
175-179	1 (2)	0
170-174	0	0
165-169	1 (3)	3 (2-4)
160-164	2 (4, 5)	3 (5-7)
155-159	2 (6, 7)	4 (8-11)
150-154	8 (8-15)	6 (12-17)
145-149	8 (16-23)	8 (18-25)
140-144	21 (24-44)	9 (26-34)
—	44	34

BINET VOCABULARY TEST

Age	*Fail.*	8	10	12	14	16	18	*Totals*
3	1							1
4	3 ⟶	1 (B11)						4
5	6 ⟶⟶⟶⟶	2	1 (B18)					9
6		7 ⟶⟶⟶⟶	5	2 (B1) ⟶ (B12)				14
7		1	1 ⟶	5 ⟶	2 (G5 G8)			9
8			1	3 ⟶	4 (B6,B2 ⟶ G6,G22)			8
9				2	9 ⟶	1 (G30)		12
10					6 ⟶⟶⟶	0	2 (B3 G9)	8
11					5	3	3 (B5 G16 B23)	11
12								0
13							2 (B13 B43)	2
Each ⟶ represents one child within five words of passing at the next age level								78

Many of them were referred directly from schools, others were brought by parents after hearing of the Centre from various sources. Fifteen of the brilliant children were tested in connection with the question of *scholarship standard*, of whom four were considered difficult; thirty-eight come under the heading of *routine testing*, of whom six proved to be difficult; and twenty-five were referred because of some *definite problem*. Thus it will be seen that thirty-five of the seventy-eight children presented some marked form of difficulty, although their problems varied considerably in severity. Many of the difficulties cleared up when the children were placed in suitable schools or their environment was adjusted to meet their needs.

II.—GENERAL FINDINGS RELATIVE TO THE DISCUSSION.

Clarity of thought.

The replies given in the test situation invariably show a clarity and decisiveness of thought, not only in advance of their years but sometimes unusual at any age Reasoning ability is always well above the average and the study bears out the already acknowledged fact that the mind of the brilliant child is logical, rich in association, far-seeing, original and ingenious.

Language development.

An analysis of the vocabularies of the seventy-eight children, based upon Binet scoring, reveals the fact that six of them passed at double their chronological age, while two children of ten were eight years ahead; one of nine and three of eleven were seven years advanced, four of eight passed at the fourteen-year level; while nineteen of various ages were five years advanced; fourteen, four years; and ten, three years, leaving nineteen who did not score conspicuously well At the same time it should be mentioned that seventeen of the children were within easy reach of passing the test at the next year level

It was noticeable that the majority of children, besides gaining large vocabulary scores, gave good definitions and also expressed their ideas clearly and fully.

Attitude to tests—With few exceptions the children entered into the test situations with zest They were almost always interested, observant, alert and responsive, quick to understand and grasp meaning, direct in their approach to new tasks with a good method of attack They were frequently confident but inclined to be self-critical and generally showed a desire to excel.

Characteristics which may hinder.—At the same time there were certain characteristics which recurred frequently and may be considered a drawback to progress and adjustment The gifted child is sometimes too quick for accuracy, often awkward and clumsy with handwork, frequently proving to be unpractical. Parents have complained numbers of times that their child's only hobby was reading, showing a tendency to one-sidedness. Besides this, the imagination of gifted children is often very vivid and is apt to be too absorbing. They may be also too wrapped up in themselves and superior in attitude, becoming unpopular through developing an opinionated, argumentative and 'bossy' attitude

Signs of precocity.—Not sufficient data has been collected to speak with authority on the early development of these children, but where notes have been made they show that walking, and especially talking, began early. Reading did not of necessity come easily to all, but G1 began to learn at two and a half, and by four could read from any book or newspaper; B4 learnt much between three and four by asking what the words were on buses, shops, etc.; G7 could read fluently at four and a half.

Abilities other than general intelligence.

Gifted children vary greatly in the strength of their special abilities. They are by no means equally advanced in all directions. They may, for instance, get a much lower score on performance tests than on the Binet, although they may equally well show outstanding ability along other lines. For instance at 13·6 B43 made a very high score on the mechanical test; G16, B25 and B31 have unusually good artistic talent; B7, B20, and G25 have produced poems of special merit, the originality of G5 also shows itself in excellent craftwork; musical ability is equally pronounced in a number, notably B8; while some excel in dancing and acting; B21 is so good at tap-dancing that it bids fair to swamp all other activities. Scientific interest was particularly strong in B10 (age 9·5). The examples given do not, by any means, exhaust the list of special abilities found in this group of children but only serve to indicate the general trend, also many are still too young to know along what lines their special abilities are going to develop.

III.—THE 'DIFFICULT' GROUP.

Signs of maladjustment.

A special study of the thirty-five children (out of the seventy-eight tested) who presented some form of problem showed that eighteen of them could be considered definitely nervous, sensitive or over-anxious, while four were suffering from the effects of serious illnesses, three of whom were hampered by some form of paralysis. Besides this, a considerable number (not less than ten) were definitely unhappy at school or actually refusing to go to school when we first saw them. It should be stated, however, that a close study of the problems showed that they were due to mishandling at home or at school rather than to the fact of brilliance itself. So often adults have not the necessary knowledge and wisdom to deal with children who appear in any way out of the ordinary. All the same, the unusual development of the specially-gifted child does create its own problems, as will be seen later.

Outstanding difficulties which made adjustment necessary.

(*a*) *Scholastic.*—Contrary to expectations eight of the thirty-five children showed some scholastic backwardness. No fewer than four were backward in reading, although in every case this had not affected the size of their vocabularies. G30, at the age of 9·11, was unable to read fluently; B31 at the age of 7·5, and G12 at 6·7, showed no interest in reading; while B15 at 6·11 showed concern over the difficulty of mastering the subject. B20 (age 9·11, I.Q. 147) was referred to us because the school thought he was stupid, B21 (age 11·8, I.Q. 146) failed to pass the scholarship examination for a secondary school; while all B8's work was uniformly poor (age 10·10, I.Q. 154). One older girl, not otherwise included in this study, was failing to make even normal progress, and another was not considered clever enough to take the school certificate examination and was actually working with younger children.

Many brilliant children are reported to dislike writing in the early stages; a great number write very carelessly. B11 often says to his teacher when the time for writing comes "Can't we just say it?" This typifies an attitude commonly found.

(*b*) *Social.*—Fifteen out of the thirty-five showed difficulties in social adjustment. The types of reports received about them are as follows: B5 (age 11·10), completely wrapped up in himself and his home, resenting all attempts to make him mix with other boys; given to emotional outbursts. B30 (age 7·3), very unhappy at school, taking a violent dislike to one of the teachers; no physical courage. B37 (age 10·0), greatly teased at a boys' preparatory school, unable to hold his own, solitary, full of phantasy, but 'bossy' when opportunity offered. G12 (age 6·7), always determined to get her own way, solid and heavy, opinionated and unpopular, smarting under the feeling that nobody likes her. B4 (age 6·1) extremely interfering and bumptious, noisy and rough, completely upsetting his group G8 (age 7·9) and G26 (age 5 5) were too tied to their mothers to make other social contacts

(c) *Personal*—A very varied collection of troubles are included under this heading B7 (age 9 6+) was over-weighted with care and suffered at times from fits of depression, being overwhelmed with doubt of himself, wondering whether he could cope with life, although his conviction that he had something to give was strong B26 (age 8·9) lacked self-assurance so badly that he said everything under his breath before he dared to speak it aloud B14 (age 6·8) was subject to violent fits of temper B27 (age 6 2) to nervous movements of the head and a stammer B28 (age 6 5) sleep-walks and frequently runs temperatures through worry. B29 (age 6·10) had always been a problem over feeding and routine tasks. B36 (age 7 6) had a lavatory complex Twelve of the children were suffering considerably through jealousy of brothers or sisters, but G4 (age 3·10, I.Q 165) was a particularly severe case of this (Six out of the seventy-eight were only children.)

(d) *Lying and stealing*—In two cases lying was considered the most serious problem and in two stealing One child, G14 (age 9·6), obviously told lies in order to show her power over an extra-conscientious, serious-minded and unimaginative governess; the other, G18, at the age of 5·2, deliberately misrepresented facts and made little effort to give correct statements. The way her lies had been received evidently encouraged her to experiment further. B34, at the age of seven, had taken apples from a shop, money from a money-box, and from another boy's coat-pocket, but had not tried to hide his misdeeds. The only serious case was a girl of eleven, whose stealing was frequent and crafty

(e) *Serious neurotic cases.*—Three children, although testing high, were in a condition which was causing considerably anxiety. One boy of nine was in a state of inner rebellion against life, chiefly through a partly paralyzed condition which made the use of his hands difficult. His anxiety was very marked during the test, and his temper outbursts were reported to be very violent. Another girl of eleven was suffering from obsessions. Each night she went through a ritual to propitiate things she called 'breathers.' She had so completely got the upper hand that she was making life unbearable in her home, while a boy of nearly eleven was the 'bad boy' of the neighbourhood, and had been involved in many anti-social acts, such as putting wood on the railway line. Later his mind began to dwell on things like forging keys and breaking into a safe. This boy, although testing high on the Binet scale, was too quick and careless to get more than an average score on any of three separate group tests, although one of them was given to him individually.

Drawbacks with which gifted children have to contend.

It might be thought that brilliance would bring with it so much satisfaction that it would make life particularly easy and pleasant, but this appears to be a mistaken idea. The following points emerged clearly during the course of this study:

1. (1) Disharmony may be caused through the uneven rate of the child's physical, emotional and intellectual development. He therefore often comes to feel 'different' from his fellows and even inferior.
2. (2) This is frequently accentuated through a lack of practical ability to which a child is apt to attach more importance than to intellectual powers.
3. (3) The child's unevenness of development may also mystify both parents and teachers. As one father said: "You said he's so clever, but why does he do such stupid things?" Emotional development (as shown by outbursts of temper, impulsive and self-assertive actions, etc.) frequently lags sadly behind the intellectual, making a uniformly high standard of behaviour impossible. Where this is not recognized further trouble frequently arises.
4. (4) Sooner or later the specially gifted child cannot help but recognize the fact that he is more far-seeing than his fellows. Unless he receives sympathetic treatment he then becomes ultra-critical and consequently unpopular with other children as well as with adults In his desire to assert his authority he may overstep the mark.
5. (5) It is also noticed that these children frequently stand aloof from their fellows, being more self-sufficient than the less clever child. This prevents them from making close friends.
6. (6) If their brilliance is not taken into account in the classroom it frequently happens that lessons are too simple and humdrum for them, so that they are in danger of not attending and becoming mentally lazy.
7. (7) On the other hand, in some cases parents become so proud of their unusual powers that they bring them into the limelight to such an extent that they become over-stimulated.

IV.—THE POSSIBILITY OF ADJUSTMENT.

The fact that so many brilliant children are pulling their weight and making a good adjustment is proof that inherent difficulties are not too great to be overcome. From a study of the children who are brilliant and yet not difficult it appears that in cases where a good adjustment is being made the child has been fortunate, in that:

(1) Neither parents nor teachers have expected too much in the early days, but a natural and healthy pride has been aroused in the child for his powers without in any way exaggerating their importance.

(2) The tendency has been to treat the child as older than he is on the intellectual plane, although still recognizing his emotional immaturity

(3) His all-round development has been encouraged.

(4) At school his powers have been sufficiently taxed.

From a number of the cases studied it would also appear that the older children who have an opportunity of being educated under a system which makes use of the research element (working on a modified Dalton plan) do better than those in the more stereotyped schools.

It may be interesting to mention that twenty-one of the seventy-eight children tested were in the same school, where the average I.Q. is high (not less than 122), and where there is a good deal of self-teaching, without emphasis on competition. It may be significant that only four of these children found their way into the difficult group and possibly the fact that so many of them are grouped together, so that they can meet their equals, contributes to their better adjustment.

Where difficulties have already arisen it is important for parents and teachers to know how far they are associated with the fact of brilliance and how far with other circumstances. Very little can be presupposed from brilliance alone. There are naturally the usual differences due to special abilities, the strength of emotion and types of temperament found among normal children.

It is apparent, however, that because of the brilliant child's clarity of thought he is far more able to understand his difficulties and can be appealed to through his good reasoning powers. The older children, especially, greatly appreciate a straightforward approach to their difficulties and are quick to see the mechanism which lies behind their actions when they are treated as reasonable beings and clear explanations given to them. They frequently respond to a talk about the actual working of the mind, and when they see the influences which have been hindering them they are more capable of taking themselves in hand.

V.—SUMMARY.

This study was made in connection with seventy-eight children whose I.Q.'s range from 140 to 180 on the Binet test, thirty-five out of the seventy-eight were considered 'difficult.'

Points which emerged were as follows:

(1) These brilliant children invariably had vocabularies above their age level, generally strikingly so

(2) Their ability to express their ideas was correspondingly above the average.

(3) Their approach to the tests showed alertness and keenness

(4) Many were reported to be too quick for accuracy, awkward and clumsy with handwork and unpractical. Common complaints were that they spent too much time reading and had become too self-centred and 'bossy.'

(5) They varied greatly in the strength of their special abilities.

(6) Among the problem children (apart from a few suffering from physical disabilities) many of their difficulties were due to mishandling at home or at school and a number of their problems resembled those of normal children

(7) Eighteen out of the thirty-five problem cases were highly nervous, sensitive and over-anxious, and at least ten were either refusing to go to school or were unhappy there.

(8) No less than eight showed scholastic backwardness Many others were reported to dislike writing.

(9) Social maladjustment was noticeable in fifteen.

(10) *The fact of brilliance does not appear to lessen the occurrence of jealousy and other personal difficulties of adjustment.

(11) Out of two cases of each only one of lying and one of stealing could be considered serious.

(12) Only three of the children were recognized as severe neurotic cases.

The study also served to emphasize the facts that·

(1) The difficulties inherent in brilliance do not necessarily create maladjustment, although they often predispose to certain forms of unsatisfactory behaviour

(2) In certain circumstances brilliant children may come to feel inferior and react accordingly.

(3) Difficulty often arises through the unevenness of their development, the physical and emotional not keeping pace with the intellectual

(4) They may also become ultra-critical, self-sufficient and mentally lazy

(5) Given the right kind of treatment these difficulties can be minimized.

(6) On the whole, highly intelligent children are easier to help than others, and if appealed to through their reason, treated as older than they are and given suitable types of education they should fulfil their early promise.

(7) It is helpful for brilliance to be recognized as early as possible and to be taken into account, although not over-stressed, both at home and school.

Résumé

DES ENFANTS TRÈS DOUÉS, PAR RAPPORT SURTOUT À LEURS DIFFICULTÉS SPÉCIELLES

Cet article est basé sur l'examen de 78 enfants très doués provenant de familles cultivées On leur appliqua à tous, dans le " Psychological Centre for School and Home," le Test Binet, et leur Quotient Intellectuel variait de 140 à 180 On les avait amenés au " centre " pour des raisons diverses, et même là où il ne se présentait aucune difficulté marquée, certains signes inquiétants se montraient. Cependant, en traitant les enfants d'une façon sympathique, il fut possible d'arriver à un bon ajustement Non moins de 35 de ces enfants étaient considérés comme difficiles Quelquesuns parmi eux souffraient des difficultés fréquentes chez les enfants, qu'ils soient doués ou non, telles le souci exagéré, le manque de bonheur à l'école, le retardement dans les études, le manque d'ajustement social et la jalousie Un nombre minime avait été amené à cause du mensonge ou du vol, et trois seulement étaient des cas névrosés graves D'autres pourtant se rendaient très impopulaires par leur attitude de supériorité, se développaient trop d'un côté à cause de l'importance exagérée qu'ils attachaient aux travaux intellectuels ou devenaient mentalement paresseux à cause du manque d'un stimulant suffisant En général l'on trouva que ces enfants peuvent très bien surmonter leurs difficultés, si l'on les traite comme plus âgés qu'ils ne sont, tout en ayant égard au niveau différent de leur développement physique, intellectuel et émotif Si les parents et les professeurs reconnaissent de bonne heure sa précocité, cela peut aider énormément l'ajustement de l'enfant

ZUSAMMENFASSUNG.

HOCHBEGABTE KINDER, MIT BESONDERER ERWÄHNUNG IHRER SPEZIELLEN SCHWIERIGKEITEN.

Diesem Artikel liegt eine Untersuchung von 78 hochbegabten Kindern aus gebildeten Familien zugrunde Allen wurde der Binet-Test an der Psychologischen Stelle für Schule und Haus gegeben, und ihr Intelligenzquotient erstreckte sich von 140 bis 180 Sie wurden aus verschiedenen Gründen ausgesucht, und auch wo es keine ausgesprochene Schwierigkeit gab, waren gewisse Gefahrensignale augenscheinlich, obgleich sich gute Anpassung als möglich ergab, wenn man die Kinder mit Sympathie behandelte. Man hielt nicht weniger als 35 Kinder für schwererziehbar, einige von ihnen litten an den Problemen, die bei Kindern häufig sind, ob diese besonders intelligent sind oder nicht, wie z B übertriebene Ängstlichkeit, Unglück in der Schule, ungenügende Schulleistungen, schlechte soziale Anpassung und Neid Eine sehr geringe Anzahl wurde wegen Lügens oder Stehlens geschickt, und nur drei waren bedenkliche nervöse Fälle Andere aber machten sich sehr unbeliebt durch ihr "überlegenes" Verhalten und wurden einseitig durch Betonung der geistigen Interessen oder geistig träge aus Mangel an genügender Anregung. Im grossen und ganzen fand man, dass solche Kinder ihre Schwierigkeiten sehr gut überwinden können, wenn man sie so behandelt, als ob sie älter wären, als sie eigentlich sind, und wenn man Rücksicht auf das verschiedene Niveau der körperlichen, geistigen und gefühlsmässigen Entwicklung nimmt Frühes Erkennen ihrer hohen Begabung durch Eltern und Lehrer kann vieles bei der Anpassung des Kindes entscheiden.

AN EXPERIMENT SHOWING THE SUPERIORITY OF A LIGHT-COLOURED "BLACKBOARD."

By W. DOUGLAS SEYMOUR
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I.—*Purpose and scope of the investigation.*
II.—*Laboratory experiment.*
III.—*Classroom experiments.*
IV.—*Summary and conclusions.*

I.—PURPOSE AND SCOPE OF THE INVESTIGATION.

THIS research was undertaken in the course of a far wider experimental investigation now being conducted by the National Institute of Industrial Psychology into the equipment and environmental conditions relating to school work

The strain felt by children in copying from the blackboard is well known. It may arise from repeated movements of the head and of the eyes—especially from changes in accommodation and in convergence. It may also be partly due to copying from a *black*board on to *white* paper, i.e., to the repeatedly reversed changes in the retina and pupil due to such changes in illumination The blackboard has a reflexion factor[1] of 10–15 per cent, whereas the white paper on to which the child copies has a reflexion factor of 85–90 per cent.

The experimental work described in this paper was conducted in order to ascertain whether a board having a far higher reflexion factor would enable children to copy with greater ease and speed. A white board was considered undesirable owing to its likelihood to cause glare. A coloured board was thought preferable, and finally a light-yellow board, somewhat lighter than the British Standard Colour No. 54, was selected, which combined the advantage of a high reflexion value with that of a colour generally agreeable and stimulating. Dark-blue letters written on such a board were found to be more easily read than black, and at normal blackboard distance they appeared black.

The research was conducted by two methods. The one was a laboratory reaction-time experiment, in which the reading-times of successively exposed short syllables by adults were compared, according as dark-blue letters on a yellow board or white letters on a blackboard were presented The other was employed in schoolrooms under ordinary school conditions; children being asked to copy a passage of prose, and the amount copied being compared according as the one or the other board was used

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[1] The proportion of the light reflected by, to the light falling upon, a surface is known as the reflexion factor. This is normally expressed as a percentage

II —LABORATORY EXPERIMENT

The subject sat with his back to the window in front of a large grey screen, about 3 feet square, in the centre of which was a smaller white screen, about 9 inches square, comparable to the pages of a copy book. This white screen was divided horizontally into two halves, which were hinged like doors and opened rapidly as a shutter when a spring was released A fixation mark was provided on this white screen. When the shutter opened, the subject saw a nonsense syllable of three letters, either white on a blackboard or blue on a yellow board, which he had to read as quickly as possible He was seated about 12 inches from the screen and about 7 feet from the board The experiments were conducted in daylight, the intensity of illumination at the screen being about 2½ times that at the board—a condition fairly representative of that found in classrooms

After initial practice, a subject was given a series of ten syllables on the yellow board, followed by a series of twenty syllables on the blackboard and by another series of ten syllables on the yellow board. For the next subject the order was reversed . he was given ten syllables on the blackboard, twenty syllables on the yellow board and ten syllables once again on the blackboard

An electric circuit was closed when the shutter reached the fully open position, and it was broken when the subject's voice actuated the voice key. This key, as well as the entire reaction apparatus, was constructed by Mr D F Vincent, B.Sc., a member of the staff of the National Institute of Industrial Psychology, who also gave valuable help in the conduct of these experiments The timing was made by a pen tracing on a paper tape which ran at a constant speed by a motor controlled by an electrically driven vibrating reed Careful tests were made of the time-lag of the apparatus, its mean value and the standard deviation and probable error of the latter were determined. These latter were found to be negligible in comparison with the variation and probable error of the speed of the subject's responses. The mean time-lag of the apparatus was deducted from the recorded reading times.

The subjects were of both sexes, twenty-two in number, and 75 per cent of them aged between twenty and thirty They did not know the purpose of the experiment. Table I shows the results obtained. As a whole, they can be regarded as having statistical significance. They

TABLE I —READING TIMES

Subject	*Colour of Board*	*Mean Time in Seconds*	*Difference*	*P E of Difference*	*Percentage Difference*
*1	Black .... Yellow .	703 621	082	014	13
†2	Black Yellow	·676 ·540	136	019	25
3	Black . Yellow	·649 545	·104	015	19
4	Black . Yellow	·703 ·676	027	019	5
5	Black . Yellow	676 ·616	060	017	10
*6	Black Yellow	438 319	119	013	37
7	Black Yellow	590 ·514	076	020	15
8	Black . Yellow	665 ·573	092	015	16
†9	Black . Yellow..	·730 ·610	120	·013	19
10	Black .. Yellow	649 610	039	012	5
11	Black .... . Yellow. .	568 ·509	065	015	13
12	Black . . . Yellow......	422 351	071	014	20
13	Black ..... Yellow ...	762 692	070	024	10
14	Black. ... Yellow	584 486	098	·027	20
15	Black. . Yellow .	·508 449	·059	021	14
16	Black. . Yellow.	698 643	055	019	8
17	Black. Yellow	432 ·378	054	018	14
18	Black. Yellow	·698 632	066	019	10
19	Black. .... Yellow	806 ·752	054	019	7
20	Black Yellow	459 387	072	·017	18
†21	Black Yellow ..	816 676	140	·023	21
22	Black Yellow	·730 676	·054	·014	8
				Mean .	15 4%

* For these subjects, owing to their defective vision, the boards were placed at a shorter distance of 4½ feet

† These subjects were known to have defective vision

clearly indicate that each of the twenty-two subjects was able to read more rapidly from the yellow board than from the blackboard, the average difference being 15·4 per cent in favour of the former.

Several of the subjects said that they noticed themselves the greater ease of reading from the yellow board. And when the two boards were seen side by side, a large number of them observed that the dark-blue letters on the yellow board seemed larger than the white letters on the blackboard Clearly the experiment opens out several problems for further investigation

III.—CLASSROOM EXPERIMENTS.

The object of this series of experiments was to compare the speed of the process of copying by children, according as they copied from white letters written on a blackboard or from dark letters written on a light-coloured board The conditions were so arranged as to approximate, as nearly as possible, to those of ordinary class work

The subjects were children attending four elementary schools in Barking and Ealing. One of these schools was a senior school, where three younger classes, consisting of boys and girls aged from 11+ to 12+, were tested The other four were junior schools, in which mixed classes of pupils from 8 to 11 years of age were tested. The junior schools had the advantage of containing an unselected group of children, but the results obtained in the senior school agreed closely with those obtained in the junior schools.

Of the two boards used one was a standard blackboard, measuring 3 feet by 2 feet and framed in 1¾-in. light oak, such as is usually supplied to elementary schools. The other board, identical in size, but framed in darker oak, was yellow, a little lighter than the primrose known as British Standard Colour No. 54. The letters on the blackboard were written in white ink, and on the yellow board in ink of a very deep-blue colour. The reflexion factors for the black and yellow boards were 14 and 85 per cent respectively, and for the white and deep-blue inks 80 and 15 per cent respectively. The letters were stencilled on to each board by the same 1-in. stencil and by the same No. 7 pen. They were equally spaced on each board

The test passage was carefully chosen so that it should be comprehensible to children aged 8 and 9 and yet be interesting to those aged 11 and 12 It consisted of 100 words (396 letters) and was as follows.

> " When the ship sank, Captain Smith swam 10 miles to the island. All the rest of the crew were drowned. At first, the island seemed deserted. Captain Smith dragged himself 20 yards along the beach and went to sleep in the shade of an oak tree When he woke

up, there was a little noise behind his head. He looked round and there, sitting 5 yards behind him, was the little man with the magic wand The little man waved his wand 3 times. 'What do you want ?' he asked The Captain sprang up. 'It's you I want,' he cried."

It was thought better to use several experimental methods rather than to test a larger number of children by one and the same method Three methods were adopted, none of which, however, was entirely free from criticism But as the results of each of them pointed definitely in the same direction, they may be considered to be more reliable than if they had been derived from a single experimental method

All the tests were given by the investigator himself to the children in the presence of their teacher and in their usual classrooms, save in one school, the children of which, however, were accustomed to move from one classroom to another The teacher gave no indication of the nature of the test: he merely instructed the children to head their papers with their name, age, etc , and informed them that they were about to have a "do as you are told" lesson.

The investigator told the children that he wanted them to copy from some boards that he had brought with him. "I'm going," he said, "to put a board on the easel First of all I want you to read it right through from beginning to end. When you've read it, I shall say, 'Are you ready ?' and then, when I say 'Off you go !' I want you to copy it down on to your paper."

The experiments were timed by a stop watch Each letter and numeral copied scored one point No points were given for punctuation. Nor did errors in punctuation, spelling, etc , receive any penalty

Method 1

A group of over one hundred children, aged between 11+ and 12+, copied for a fixed period (6 or 8 minutes according to age) from the blackboard; and another group of the same age and approximately of equal size, strictly comparable in educational attainments, copied from the yellow board for the same length of time. The results are shown in Table II

TABLE II.

Number of children	*Colour of board.*	*Mean number of letters copied per minute.*	*Difference and its P E*	*Percentage increase for yellow board over blackboard*
115	Black........	32·3	3·2 ±0·85	9·9
107	Yellow.......	35·5		

From this table it will be seen that the group which copied from the yellow board copied on the average nearly 10 per cent more letters than the group which copied from the blackboard, and that this difference is statistically significant, being nearly four times its probable error

Method 2.

In this experiment, one group of nearly 200 children, aged between 10 and 12, copied the passage from the blackboard as far as they could, and then (starting afresh) copied the same passage from the yellow board for the same period of time as in the previous experiment A second and strictly comparable group started on the yellow board and changed to the blackboard. Each group, owing to increasing familiarity with the passage, copied more from the second board than from the first The results are shown in Table III

TABLE III

Number of children	*Colour of first board*	*Colour of second board*	*Mean number of letters copied*		*Difference*	*Percentage increase for yellowboard over black-board*
			From black-board	*From yellow board*		
192 194	Yellow... Black	Black. Yellow.	32·80	35 27	2 47	7·55

It will be seen that the mean number of letters copied per minute from the yellow board (first and second attempts) is 2 47 greater than the mean number copied per minute from the standard blackboard—that is, a difference of 7·55 per cent in favour of the yellow. Obviously the experimental conditions do not permit of the above data being treated for the evaluation of probable errors.

Method 3.

Here over 400 children, aged between 8 and 11, copied continuously first from the black, next from the yellow, and finally from the blackboard The total time spent in copying from the blackboard was the same as that spent in copying from the yellow board The youngest children, aged 8+, were given 4, 8, and 4 minutes, those aged 9 and 10 were given 3, 6 and 3 minutes, and those aged 11 were given 2½, 5 and 2½ minutes, for these three periods respectively. In this experiment they were instructed to go straight on with the passage from one period to another and to start again at the beginning of the third period, if they had come to the end of the passage.

TABLE IV

Time in minutes	*Range of number of letters copied from blackboard*	*Number of children*	*Mean number of letters copied*		*Difference*	*Percentage increase for yellow board over blackboard*
			From blackboard	*From yellow board.*		
2½, 5 and 2½	125–150	25	137·5	150·0	12·5	9·2
	150–175	27	158·2	178·9	15·7	9·6
3, 6 and 3	50– 75	23	64·0	70·4	6·4	10·0
	75–100	54	88·3	96·3	8·0	9·0
	100–125	77	110·5	122·2	11·7	10·5
	125–150	62	137·7	149·7	12·0	8·7
	150–175	59	161·7	174·6	12·9	8·0
	175–200	29	183·5	200·7	17·2	9·1
	200–225	15	208·3	228·7	20·4	9·5
4, 8 and 4	100–150	14	127·4	158·7	31·3	24·6
	150–200	17	169·9	183·1	13·2	7·8

The results are shown in Table IV. It was thought interesting here to arrange them in relation to speed of copying. The three groups of differently aged children are accordingly each sub-divided on the basis of the number of letters which they were able to copy from the blackboard. It is clear that, whether the children are fast or slow copiers, the percentage increase in copying from the yellow board, as compared with the amount copied from the blackboard, is approximately the same. The differences range from nearly 3 to 8 times their probable errors.

In this large group of 402 children there were 91 who failed to copy more from the yellow board than from the blackboard A certain number of these exceptional cases may be attributed to such accidental disturbances during the experiment as dropping the pen, blowing the nose, etc., which were in fact observed to occur by the investigator. This, however, is unlikely to account for more than about one-quarter of the 22 6 per cent of exceptional children. Perhaps in some cases the yellow board may have suffered adversely through its strangeness, and in some others through the dislike of its colour.[1] In others, again, the disadvantages of the blackboard may have been compensated for by increased effort. But it is clear that these exceptional cases demand future closer investigation.

TABLE V

Time in minutes	*Number of children*	*Mean number of letters copied*		*Difference*	*Percentage increase for yellow board over blackboard*
		From black-board	*From yellow board*		
2½, 5 and 2½	67	196·0	200·4	4·4	2·3
3, 6 and 3	304	170·0	172·6	2·6	1·5
4, 8 and 4	37	181·8	184·0	2·2	1·2

The same children who undertook the previous experiment repeated it later, but this time the blackboard was used in the middle period.[2] Unfortunately, owing to the approach of the summer vacation, only a week elapsed between the two experiments, and this proved insufficient for the children to have forgotten the passage. Consequently they copied

[1] There is, on the other hand, the possibility that the speedier copying from the yellow board in the majority (77·4 per cent) of the children was partly due to the stimulus of its novelty. But this explanation cannot be applied to the shorter reading times of the adults

[2] In the results are included data from a group of children aged about 12, which was too small for inclusion in Table IV These, counterbalanced by certain absentees in the repeated experiment, account for the slight increase in the total number

considerably more in the same time, some of them being observed to write quite long passages without reference to the board. It is not surprising, then, that the results recorded in Table V show a great reduction in the advantage of the yellow board.

The differences are not statistically significant But they support the striking results of the three previous experiments on school children and those of the reading times of adults.

IV.—SUMMARY AND CONCLUSIONS.

The object of this research was to compare the time taken to read white letters on a blackboard and to copy them on to white paper with the time taken to read dark letters on a light-coloured board and to copy them on to white paper. Under the former conditions the pupil and retina were subjected to repeated changes in brightness, whereas under the latter conditions the brightness of the light from the board on which the words were presented and from the paper on to which they were copied was nearly the same.

In the laboratory 22 adults were tested by a reaction-time apparatus and a voice-key, in order to compare their reading-times of short syllables according as they were written in white on a blackboard, or in deep-blue on a yellow board. These times were on the average 15·4 per cent shorter when the subjects read from the yellow board than when they read from the blackboard.

In three different experiments upon over 1,000 cases in elementary schools under classroom conditions, the speed of copying a set passage from a standard blackboard was compared with that of copying it from a yellow board. The children were found to copy nearly 10 per cent more in the same time from the yellow board than from the blackboard.

These results suggest that an appreciable saving in time, and presumably of strain, is obtainable by substituting a light-yellow board for the standard blackboard.

The author is greatly indebted to Dr. C. S. Myers, F.R.S., for help in planning the experiments, and to Mr. D. F. Vincent for assistance in conducting them.

RÉSUMÉ

UNE EXPÉRIENCE QUI DÉMONTRE LA SUPÉRIORITÉ DU "TABLEAU NOIR" À FOND CLAIR

On fit cette étude du tableau noir pour découvrir si l'adaptation de la prunelle et de la rétine exigée en levant constamment les yeux du papier blanc au tableau noir pouvait être diminuée en substituant des lettres foncées sur un fond clair avec, par conséquent, une augmentation de la vitesse avec laquelle on peut copier Une expérience de laboratoire fut inventée pour comparer le temps de réponse en lisant des syllabes sans sens sur un tableau noir avec celui qu'il fallait pour les lire sur un tableau jaune clair Vingt-deux sujets montrèrent une augmentation moyenne de vitesse de 15 4 pour cent en lisant sur le tableau jaune

Dans une série d'expériences de salle de classe, l'on compara la vitesse des élèves en copiant un extrait de prose sur un tableau noir ordinaire avec leur vitesse en le copiant sur un tablau jaune Dans trois expériences, comprenant plus de mille cas, les élèves copièrent à peu près 10 pour cent de plus dans le même temps, en copiant sur le tableau jaune.

Ces résultats semblent suggérer qu'on pourrait obtenir une grande épargne de temps, et probablement une diminution de l'effort exigé en copiant, en employant des lettres bleu foncé sur un tableau jaune clair, au lieu de lettres blanches sur le tableau noir

ZUSAMMENFASSUNG.

EXPERIMENTELLE BEWEISFÜHRUNG DER VORTEILE DER HELLFARBIGEN WANDTAFEL.

Diese Untersuchung über die schwarze Wandtafel wurde gemacht, um festzustellen, ob die Veränderungen in der Grösse der Pupille und die Anpassungsfähigkeit der Netzhaut, die mit dem wiederholten Aufblicken von weissem Papier auf die schwarze Tafel verbunden sind, vermindert werden könnten, indem man dunkle Buchstaben auf einer hellen Tafel benutzt in der gleichzeitigen Erwartung, dabei noch eine erhöhte Geschwindigkeit im Abschreiben zu erreichen

Ein Institutsversuch wurde ausgedacht, um die Antwortzeiten beim Ablesen zusammenhangloser Silben von einer schwarzen Tafel und von einer hellgelben Tafel zu vergleichen 22 Versuchspersonen waren im Durchschnitt 15 5 % schneller beim Ablesen von der gelben Tafel

In einer Reihe von Klassenversuchen wurde die Schnelligkeit von Kindern beim Abschreiben einer gegebenen Prosastelle von einer der üblichen schwarzen Tafeln mit der Schnelligkeit beim Abschreiben von einer gelben Tafel verglichen In drei Versuchen mit mehr als 1000 Fällen schrieben die Kinder in der gleichen Zeit 10 % mehr von der gelben Tafel ab

Diese Ergebnisse zeigen, daß eine grosse Zeitersparnis und wahrscheinlich eine Herabsetzung der Anstrengung beim Abschreiben erreicht werden könnten, wenn man dunkelblaue Buchstaben auf einer hellgelben Tafel an Stelle von weissen Buchstaben auf einer schwarzen Tafel benutzen würde

A PSYCHOLOGICAL STUDY OF MATHEMATICAL ABILITY, WITH SPECIAL REFERENCE TO SCHOOL MATHEMATICS.

BY HILDA W OLDHAM

I —*The problem stated · Is there a group factor common to the different branches of mathematics, or does each form a separate ability?*
II —*Previous investigations.*
III.—*A questionnaire sent to teachers*
IV —*The nature of the tests*
V —*The statistical analysis · a discussion of the correlations between the different branches of mathematics and of each with intelligence.*
VI —*Suggested bonds between mathematical abilities*
VII —*An investigation of tetrad differences.*
VIII.—*Summary*

PART I.

I —THE PROBLEM.

THIS was an investigation of the mathematical abilities of school children It stretched over a period of five years

The abilities of arithmetic, algebra and geometry were investigated by means of tests specially prepared for the ages of the children and the types of schools they attended

The problem was to discover by statistical analysis

(*a*) If there were a group factor common to all three branches of school mathematics or to any two branches, or throughout one branch
(*b*) How each branch of mathematics correlated with intelligence.
(*c*) What the correlations were like when intelligence was held constant, and also when only two out of the three abilities varied, the third ability and intelligence being constant.
(*d*) From a general survey of the correlations together with what introspection was obtainable from the children, the attitude of the children to mathematics, and the factors influencing high or low ability in mathematics.

II —PREVIOUS INVESTIGATIONS.

D. J Collar,[1] K. Cooke,[2] C Buswell,[3] C. Hubbard-Judd, Thorndike, and others have made interesting contributions concerning the nature of arithmetical ability Professor Line,[1] Cox,[2] Rogers, and Dr. William Brown[3] have discussed mathematical ability. Dr Brown and Rogers found no group factor common to both geometry and arithmetic Wilson[4] obtained quite different results. R. A. Pritchard's[5] *The Relative Popularity of Secondary School Subjects at Various Ages* is of interest in connection with this problem, as revealing the unpopularity of mathematics J M Blackburn's[6] *Individual Differences in the Performance of a Simple Test* is of further interest.

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[1] *Survey of Arithmetic Ability.—British Journal of Psychology*, XI, Part 1

[2] *An Investigation of Some of the Factors Involved in Arithmetic Ability in School Children*

[3] *Summary of Educational Investigations relating to Arithmetic*

III.—THE QUESTIONNAIRE.

The research began by a questionnaire sent to schools of different types in different localities. The report of the replies to the questionnaire forms the preliminary part of the work.

The Questionnaire

Have you observed any differences in your pupils' performances in arithmetic, algebra, geometry?

If so, does it seem to you to be an innate difference, or can you explain it by some prevailing circumstance?

Answers to the questionnaire were received from fifty schools, involving about 2,500 children.

Conclusions from the Answers to the Questionnaire.

There is a good deal of agreement that inequalities in ability to do geometry, algebra, and arithmetic tend to disappear as the pupil goes up the school; but that such inequalities do exist at any rate in the lower forms.

There seems to be an opinion amongst teachers of mathematics that their pupils are sometimes lacking in the ability "to see and realize what is given in a pictorial form" and so are unable to solve a problem in geometry or reproduce a theorem unless they learn it off by heart. Those who hold this opinion do not suggest that the pupils gain skill in geometry as they grow older, though many of them do quite well in arithmetic and algebra

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[1] *The Growth of Visual Perception in Children.—British Journal of Psychology Monograph No.* 15.

[2] *Mechanical Aptitude.—British Journal of Psychology*, XI, Part 1

[3] *An Objective Study of Mathematical Intelligence, Biometrika*, VII.

[4] *British Journal of Educational Psychology*, 1933, Vol. 3.

[5] *British Journal of Educational Psychology*, 1935, Vol 5.

[6] *British Journal of Psychology*, XXI, Part 4.

There does seem to be a measure of agreement, too, concerning the existence of the pupil who can gain good marks in geometry but not in arithmetic or algebra , these cases, however, seem to be rarer than those in which arithmetic or algebra are better done than geometry There are numerous cases where arithmetic is done better than algebra or geometry.

Few answers to the questionnaire denoted explanations of differences from innate causes, but gave the reasons for any observed differences as coming from adventitious causes such as bad grounding, greater practice and such like.

My experience in the teaching of advanced course mathematics also pointed to a difference in ability in analytical and geometric method.

These observations concerning the differences in the nature of geometric and arithmetic ability have their confirmations in those recorded of the growth of mathematical learning in Greece and in India.

Any history of mathematics relates the fact that the Greek mind was pre-eminently geometrical while the Indian was first of all arithmetical. The Hindu dealt with number, the Greek with form After the time of the ancient Greeks the first people, whose researches had great influence in the progress of mathematics, were the priestly class amongst the Hindus, the Brahmins Numerical symbolism, the science of numbers and algebra reached far greater perfection in India than they had previously attained in Greece

On the other hand, Hindu geometry was merely mensuration with no attempt at generalized theory. Hindu trigonometry had merit, but rested on arithmetic more than on geometry

Hindu mathematics always remained a slave to astronomy while Greek mathematics had an independent existence, it was studied for its own sake The question arises in comparing the Greek and Hindu mathematics, whether there was different national characteristic or ability which made the one lean to geometry, the other to arithmetic and algebra.

The grandest achievement of the Hindus was the perfecting of the so-called " Arabic notation " Everyone admits to-day that this notation did not originate with the Arabs. The Greeks, after gaining a knowledge of elementary geometry from the Egyptians, built upon it a structure which is still standing

So these two nations reached two different pinnacles of mathematical conception.

It may have been a difference of attitude to life rather than some innate difference in national characteristic.

Greek mathematicians were in the habit of discriminating between the science of numbers and the art of calculating. The former they called arithmetica, the latter logistica. The Sophists enjoyed the art of calculation. Plato was interested in arithmetica but considered calculation a vulgar and childish pursuit This throws some light on the difference between the Hindu and Greek mathematics The Hindu wanted his mathematics for the purpose of astronomy in which he was interested, so his mathematics was in the nature of a tool. On the other hand, for the Greek, mathematics was an end in itself In my reading of the history of mathematics I have found indications of a possible explanation, in some cases, of these differences in mathematical abilities It seems to lie in interest, fashion and the lead given by popular teachers The same causes may operate to make some boys better at arithmetic than geometry, that made the Hindus pay so much more heed to arithmetical calculations than to geometric proofs

Interest and other outside influences, however, do not seem able to account for all such differences in mathematical abilities

IV —THE NATURE OF THE TESTS

Tests were carried out between 1932 and 1935 in four secondary schools, three central schools and one elementary school

In all 410 children (261 girls and 149 boys) were tested, their ages ranging from nine to fifteen years The intelligence test used was Professor Burt's Northumberland Test. Those tests given in arithmetic, algebra and geometry I set myself; sometimes the teachers collaborated. The reliability coefficients of the tests were found, and were generally over ·80.

In addition to these tests, two forms were given "space tests." One of these forms, consisting of thirty girls, was a first year of a secondary school, it had done geometry for nearly one year The average age of the form was twelve years. The other form was from an elementary school and it had done no geometry. It consisted of seventeen boys and sixteen girls; the average age was 9½ years

In these space tests questions were set which were aimed at getting the child's conception of spatial relations, without any knowledge of formal geometry being involved.

Amongst others, questions were set on the form variator which was shown to the children. This form variator was invented by Professor Stern, who gave me permission to use it It is a cube made of metal rods, jointed so that the cube can be altered to form different figures.

TABLE I.

Gr'p	Number	Av Ages	r_{ab}	r_{ac}	r_{bc}	r_{ag}	r_{bg}	r_{cg}	$r_{ab.g}$	$r_{ac\,g}$	$r_{bc.g}$	Av I Q	M V of I Q
A	18 girls.	15·3	·64 ± 11	·62 ± ·11	·65 ± 10	·20 ± ·17	·20 ± 17	20 ± 17	·62	60	·69	116	4·4
B	19 girls.	14·4	67 ± 10	·53 ± 13	·57 ± ·12	20 ± 17	20 ± 17	21 ± ·17	·66	51	55	108	7·2
C	24 girls	13 10	·66 ± 09	52 ± 11	·58 ± ·10	·35 ± 14	·26 ± 14	35 ± 14	68	·45	54	119	5 7
D	41 boys	14· 2	·52 ± 09	51 ± 09	·61 ± ·08	·36 ± ·10	27 ± 11	·27 ± 11	·47	46	·58	111	6·3
E.	29 girls.	13· 2	74 ± ·07	39 ± ·12	77 ± ·06	·21 ± 14	·15 ± ·14	29 ± 13	73	·35	77	117	12·3
F	28 girls.	13· 4	·78 ± 06	·46 ± ·11	66 ± ·08	50 ± ·11	·55 ± ·10	51 ± 11	70	28	·53	109	6·5
G	27 girls.	13 2	72 ± ·07	·67 ± ·08	·83 ± ·06	·35 ± 13	23 ± 14	24 ± 14	·70	·64	82	116	8·7
H.	26 girls	12 0	—	71 ± ·07	—	·38 ± 13	—	·60 ± ·10	—	·65	—	123	9·8
I	24 girls.	12 2	—	·60 ± 10	—	·56 ± ·11	—	27 ± ·14	—	·56	—	116	12·0
J	34 18 boys, 16 girls.	13· 0	·44 ± 11	·41 ± ·11	·52 ± ·095	·52 ± ·095	21 ± 12	24 ± 12	·40	34	·49	107	6 2
K.	31 17 boys 14 girls.	12· 7	·43 ± ·11	·31 ± ·12	41 ± 11	·39 ± ·12	·23 ± 13	21 ± 13	·38	·25	38	111	7 3
L.	34 boys	13· 0	·42 ± ·11	·21 ± ·12	·31 ± ·12	·52 ± ·095	·21 ± ·12	·34 ± ·12	·37	·04	·26	106	8·1
M.	42 22 boys, 20 girls	11 9	55 ± 06	54 ± ·08	56 ± 08	54 ± 08	43 ± 095	36 ± ·10	·42	·44	·48	102	19·4
X.	33 17 boys 16 girls.	9 6	—	—	—	51 ± 10	—	—	—	—	—	92	29·6

N.B.—Correlations *a*=Arithmetic, *b*=Algebra, *c*=Geometry Ages given in years and months.

TABLE II.

TABLE SHOWING THE CORRELATION COEFFICIENTS OF THE SPACE TESTS WITH SOME OF THE OTHER MATHEMATICAL ABILITIES.

Group	*Number.*	*Av Age.*	r_{ac}.	r_{as}	r_{cs}	$r_{ac.g}$	$r_{as.g}$	$r_{cs.g}$	r_{ag}	r_{cg}.	r_{sg}.
H.	26	12·0	·71 ± 07	·45 ± ·12	59 ± 10	·65	35	·47	·38 ± ·13	·60 ± 10	·42 ± ·12
X	33	9 6	—	·00	—	—	·00	—	·51 ± 08	—	16 ± 19

N B —*s*=Space tests; *a*=Arithmetic, *c*=Geometry, *g*=Intelligence. Ages given in years and months.

TABLE III

AVERAGE CORRELATIONS.

r_{ab}.	r_{ac}.	r_{bc}.	r_{ag}	r_{bg}	r_{cg}	$r_{ab.g}$	$r_{ac.g}$	$r_{bc.g}$	$r_{ab.c}$	$r_{ac.b}$	$r_{bc.a}$
·60	50	·59	·40	27	·31	55	·43	55	·46	15	·45

V.—STATISTICAL ANALYSIS OF THE TESTS

Table I gives the correlations between the tests of arithmetic, algebra, geometry and general intelligence taken in pairs.

$r_{ab.g}$ denotes the correlation between arithmetic and algebra when general intelligence is held constant similarly for $r_{ac\,g}$ and $r_{bc\,g}$.

In the last two columns are the average intelligence quotients of the forms tested and their mean variation (M.V.)

S denotes the space tests

Table II is a comparison between the correlations between the space tests and the other mathematical abilities tested, and with general intelligence

Table III gives the average correlations

The probable errors are denoted by ± after the correlation

The Pearson Product-Moment formula was used

As some of the groups tested were small it was thought that the significance of the result tested by $\frac{\cdot 6745\ (1-r^2)}{\sqrt{N}}$ might not be reliable, so the criterion developed by R. A. Fisher was used to check the other one.

Even though strictly speaking a number of the coefficients are of doubtful significance, yet so many of them are by any criterion, on the border line, that for purposes of comparison their consideration seems admissible Professor Spearman, on page 57 of *The Abilities of Man*, speaks of low correlations being "vitiated by a fatal flaw, that of attenuation"

If these insignificant correlations had been corrected for attenuation they would have become significant in many cases The writer, however, feels that corrections for attenuation give sometimes too rosy a picture of the real facts, and prefers to discuss the correlations uncorrected for attenuation

Explanations offered for the variations in the numerical results:

(*a*) Considering the column r_{ab} we find a range of correlations running from 78 (F) to ·42 (L). Of these, only four are of doubtful significance by the Fisher criterion, and by our usual probable error test we might say that none are really insignificant The average correlation is ·60

There is a big range from ·78 to ·42, and for this some explanation must be sought.

Where the correlation is high the subjects have been taught by the same teacher, and have been run together a good deal—algebra was introduced through arithmetic—accuracy was stressed in both. The similarity of rules was stressed.

In the secondary school where $r_{ab} = \cdot 78$ and ·72, algebra was not taught formally until the second year, but in the first year the children were being prepared for it by using self-evident formulæ and having easy problems involving letters, e.g., if three jugs cost 4s. 6d. how much will *n* jugs cost?

Similar teaching went on in the school containing Group E and the school containing Groups A, B and C. These children thought of algebra as harder arithmetic.

In two of the central schools r_{ab} was only ·44, ·43 and ·42. These children had done constant daily exercises in arithmetic at the council schools. Some of them had done complicated money sums involving a knowledge of stocks and shares, compound interest, etc. For them algebra was a new subject belonging to the central school, that had little more arithmetic to teach them, and so was offering them this new difficult and totally different subject called algebra.

The majority of the children in the schools in which a high correlation between arithmetic and algebra was found had not learnt arithmetic to such a high standard before beginning algebra, as those entering the central schools. Comparatively few of the former were acquainted with difficult money sums. So the division "arithmetic has to do with money, and algebra with letters" would not so easily arise in the schools where r_{ab} was larger. In these schools arithmetic had sometimes to do with letters, and the answers to some algebra sums were in pounds, shillings and pence.

The teaching of algebra in the central schools containing Groups J, K and L, was a little formal and the children found it rather difficult.

In between these two different sets of correlations we have two other schools, M and D, with correlations of ·55 and ·52 respectively. These results were of great interest for the teaching and consequent attitude of the children seem to lie in between the two sets described above.

In both these schools the teaching of algebra was more formal than in those where the correlations between arithmetic and algebra were higher. But at D the arithmetic was not known to a very high standard before algebra was begun, although there was a tendency to associate algebra with geometry more than with arithmetic.

In M the children knew a good deal of arithmetic and had constant practice in it before beginning algebra, but the teacher was very zealous in teaching his chief subject "mathematics," and I felt as I tested these children that they regarded arithmetic, algebra and geometry as parts of one thing They worked very well as a form and were anxious to show up well Had they been introduced to algebra in the arithmetic lessons their correlation of arithmetic with algebra would probably have been much higher.

(*b*) The column r_{ac} will now be discussed—i.e., the correlation between arithmetic and geometry. In every case this is a little lower and in some cases (e.g., E and F) considerably lower than the correlation between arithmetic and algebra The average correlation is ·50. From considerations of the probable errors, three of these may be considered insignificant, and by applying the Fisher test, B, F and J in addition must be counted insignificant

Some explanation must be sought for the range of correlations in this column also The range runs from 71 ± 07 (H) to 21 ±·12 (L). I had some interesting conversations with the children in H, and was not surprised to find that it was the most intelligent form tested This form had done geometry for a year, but had not yet begun algebra. These children were taught geometry and arithmetic by the same teacher, who was a strong personality and illustrated the one subject by the other where possible

The class worked well together; it was a good "Gestalt." It never suffered from moving about from one room to another and maintained the same general attitude in both arithmetic and geometry

The high correlation then seems due in parts to a general connection between geometry and arithmetic existing by virtue of the teaching Intelligence seems to have had some share, too, in this correlation between arithmetic and geometry, for when it was held constant the correlation fell to 65 The class, being highly intelligent, and keenly interested in their school work, were using their intelligence in both arithmetic and geometry to the utmost

The connection of number was also apparent, the children good at arithmetic could find something connected with number to interest them in nearly every lesson in geometry.

What has been said of H applies to Group I in the same school. The form was not quite such a good unit, however, and the personality of their teacher not quite so unifying to the form. Group G in this school obtained a fairly high correlation between arithmetic and geometry and what was said of I applies to them. But in F the correlation fell to ·46. This did not surprise me. F consisted of girls from different types of schools. Some had come from elementary schools and were familiar with the technique of arithmetic Others had been taught in small private schools, where arithmetic had not been so emphasized, and where the methods used were often very clumsy

The teacher in F had a wonderful way of inspiring the children to put forth their best efforts. They paid great attention to each branch of mathematics. In arithmetic, however, the specific factor had not had the chance to develop so well as the specific factor in geometry The arithmetic "engine" had its wheels clogged by bad methods, whilst the geometry "engine" had been able to run smoothly from the first So it was natural that the correlation between arithmetic and geometry in F would be lower than in G We should expect a connection, however, coming by way of the influence of general intelligence and of number, and this we have apparently got

Neither F nor G had become acquainted with arithmetic as a subject which involved difficult money sums. So the general connection of geometry with arithmetic through number would be an influence on correlations in both forms.

The correlations between arithmetic and geometry in the forms A, B, C, D, E, M and J, such as they are, seem to come from connections due to number applied to geometry and to general connection by virtue of teaching. In each case arithmetic and geometry were taught by the same teacher.

In forms K and L the correlations were insignificant, but may be taken as a possible indication of low correlation. The writer noticed in K that there was very little form spirit The form went into a different room for mathematics and their morale seemed to suffer. Their teacher did not seem to be able to hold them together and it seems very unlikely that the bond between geometry and arithmetic by virtue of teaching would be a very strong one

In L the boys did not move from their form room for mathematics, but they seemed to regard geometry as entirely unconnected with arithmetic. Their teaching in geometry was sound, but did not involve the use of number to any appreciable extent. Their teacher taught them other subjects, too, and so would not be regarded by them specially as a teacher of mathematics.

(*c*) The column r_{bc} will now be discussed.

Here the range is from ·83 (G) to ·31 (L).

The average correlation is ·59. From a consideration of their probable errors there is only one really insignificant correlation. From Fisher's criterion three of the correlations are insignificant.

As in the correlation between arithmetic and geometry, general connection by virtue of teaching is an important link.

Connections through area, too, were apparent in all the forms tested, except, perhaps, L

The fact that K was not a real unit helps to explain its possible low correlation, on the same lines of argument pursued in discussing the correlations of arithmetic and geometry There was a good deal of interchange of geometric and algebraic proofs throughout the work in all forms. Formulæ such as

$$\text{Area of a Triangle} = \tfrac{1}{2}\ \text{Base} \times \text{Height}$$

were manipulated for practice in substitution.

In the higher forms Pythagoras and other theorems were sometimes given an algebraical form of proof.

We saw, too, connections through power of generalization, sense of proportion and logical deduction entering the factors governing the correlations in all three columns discussed.

(*d*) The three columns headed r_{ag}, r_{bg}, r_{cg} will now be taken together.

Forms A, B, E and G gave insignificant correlations for all three subjects with intelligence, but there may be considered to be the possibility that these correlations are low.

The forms J, K and L gave insignificant correlations for algebra and geometry with intelligence. This again gives an indication of low correlation. It might be said that the factor of selection would account for such low correlations.

Obviously if the class has a narrow range of I Q.'s any subject would give a low correlation with intelligence This factor is not enough to account for these low correlations given in the table appended.

Form E had a fairly wide range of intelligence quotients, but here

$$r_{ag} = 21$$
$$r_{bg} = 15$$
$$r_{cg} = \cdot 29.$$

These are insignificant, but may point to very low correlations.

Again, none of the four forms F, G, H and I were classified according to I.Q 's but according to age.

Yet we have for,

F, $r_{ag} = 50$, $r_{bg} = \cdot 55$, $r_{cg} = \cdot 51$;

And for·

G, $r_{ag} = \cdot 35$; $r_{bg} = 23$, $r_{cg} = \cdot 24$;

In form G each of the three subjects correlates well with the other The mathematics teacher here was the great unifying influence. The three subjects were regarded as mathematics, which, on the whole, the form liked, and could do fairly well. In G, however, we find these possibly lower correlations with intelligence, referred to above. In the correlations of arithmetic and intelligence the explanation seems to lie in the fact that F had not had such good grounding in arithmetic as G. The children in F came from a wider range of schools including a number of small private schools as mentioned before

Form F, however, was a very good unit, and was anxious to do well They put their energies into their work

To get good marks for arithmetic they had to use their intelligence to counteract as far as possible their bad groundwork

So for F, in the language of Professor Spearman, " their engines " of arithmetic had not been working at full speed in their earlier years, and so a good deal of general intelligence was needed to keep them going. Hence the intelligent girls would be able to revise their poor methods and to get them in line with the teacher's new ones. The duller ones would be more easily befogged and so would find it more difficult to adopt the new methods and to fall in line with the new teaching

The fact that arithmetic demanded their full attention and thus the use of their full intelligence, affected their work in geometry and algebra. Their mathematics teacher urged them to put forth their best efforts and they responded very well.

The writer, from considerations of this form, and others, has been led to the conclusion that the important factor dominating the correlations of mathematical abilities with intelligence is the extraneous factor of interest.

In G the children obtained fairly good marks for mathematics on the whole. They were, however, interested in all their school work and were not called upon to pay special attention to arithmetic, because of any weakness there So the way was open for girls in G to pay more attention to some other subject than to any branch of mathematics There was no appeal thought necessary, because of bad work in the first year, to concentrate on mathematics Thus the specific nature of arithmetic was allowed its full influence

These observations were confirmed by the children's introspections

The children in forms A, B and C were not interested in arithmetic, a few of them felt it was a necessary evil which had to be faced if they were to pass school certificate. Still fewer of them had some interest in figures and some did not like to be beaten. But except for the small number who wished to earn their living by teaching, the forms consisted of girls who looked forward to home and society life.

Many of these girls were interested in current topics, and had read comparatively widely, but they isolated mathematics from the real interests of their lives and so did not direct their mental energy to the sensible solution of mathematical problems In short, these girls did not pay attention to mathematics

It might have been possible to draw up a test for these girls in such a way as to draw their attention to mathematics. My chief object, however, in this research, was to examine mathematics as taught in schools and to discover if arithmetic, algebra and geometry involve abilities different enough to justify their being considered separate subjects for matriculation For if so, then school certificates would have to give credits in these three branches of mathematics just as they do now in English, history, and geography

The factor of interest enters very largely into all work in mathematics in schools For the most part the correlations of all three subjects with intelligence are probably low In eight out of the fourteen r_{ag} is less than ·5 The highest value for r_{ag} is 56 In only one case was r_{bg} greater than 3 In only two cases was r_{cg} greater than 5

It seems explicable why the correlation of arithmetic and intelligence was comparatively high, viz , 51 in the elementary school. Arithmetic here was one of their chief subjects ; they had a lesson every day and the importance of the subject loomed very big on their horizon. "To get your sums right" was a very real ambition in such a school So the attention of this class would be fixed on their arithmetic lesson to a greater degree than in classes or schools where it was less important as a hallmark of ability.

For M $r_{ag} = {\cdot}54$; this class was less selected than many other schools tested. The children are given a very good examination, which, as far as possible, sorts out the intelligent ones from those less intelligent. But since there are a large number of places available in the central schools in this city, there is a wide range of intelligence in the children selected for these schools

If this were the only factor, however, we should expect forms J, K and L (three forms in central schools in another city) to have a much lower correlation between arithmetic and intelligence than the central school form M. For the forms J, K and L were second years, and were classified as far as possible according to ability, whilst the children in M were first years, and had not been divided up according to ability after once getting to the central school.

However, for J, $r_{ag} = 52$, for K, $r_{ag} = {\cdot}39$, for L, $r_{ag} = 52$. We must look for some other explanation, therefore, than the one factor of selection.

I tried to get the attitude of the children to the tests and to the subjects in general Where the children expressed their pleasure in the subject, or the test, or both, the correlation was higher This applied in every case except the elementary school, where the pleasure and intrinsic interest in the subject seemed to be masked by the children's keenness to show what they could do to let "that new teacher" see how clever they were. The general impression the writer got from the attitude of forms M, L, J, F and I was that the children on the whole enjoyed doing arithmetic.

The spontaneity of the children's remarks was delightful I began to talk to the form as soon as the test papers were collected Usually the conversation was begun by asking which of the subjects the children liked best. In some cases the children began to talk themselves Sometimes I began by thanking them for doing the tests and explaining to them a little of their object

The observations made upon the correlations were helped by this revelation of the children's subjective attitudes

In the four central school sets the correlations between intelligence and arithmetic were higher than those between intelligence and algebra, and between intelligence and geometry

The conversations revealed rather a lack of interest in algebra and geometry in Forms J and K, which would affect their correlations with intelligence as discussed previously. Also, as geometry and algebra were taught in these schools, they tended in the early stages to be somewhat mechanical and specific in intelligence.

A consideration will now be given to the result of the space tests given to Form H (secondary school) and to Form X (elementary school)

(1) *Form X* (Elementary School)

The correlations of space tests with arithmetic test came to ·00 The correlation of the space tests with intelligence was 16 ± ·13.

As before, I got into personal contact with the children I felt that this was especially necessary with the younger class, so as to try to understand some of the factors influencing their work. It would seem, of course, that the low correlation probably indicated was divorced from any reasonable analysis of intelligence. However, I watched some of the children, as I showed them the form variator, and, indeed, throughout the whole of these space tests Several children, one girl and one boy in particular, completely changed their expressions and general listless attitude, as the questions about space were put to them. It was as though they were saying to themselves, " Here at last is something we can do " The writer made notes of the names of these children, and whilst their I.Q.'s were very low their space score was high.

e g , G B. (girl), I Q., 75 , space score, 62 per cent.
A W. (boy), I.Q , 75 , space score, 56 per cent

The three children of outstanding general intelligence, with I Q 's of 135, 129, 124 obtained respectively 60 per cent, 44 per cent, 40 per cent, not very high compared with their I.Q.'s One boy of I Q 85 said as the test was proceeding, " I wish we had this all day " He obtained 46 per cent, which was a high score considering the number of the tests, and the difficulty such a dull child would have in grasping instructions

(2) *Form H* (Secondary School)

The children of the first year in the secondary school had the highest average intelligence of any class tested. Their way of attacking the space tests was entirely different from that of Form X, but they, too, liked the form variator The girl making the highest score of 90 per cent for the space tests had an I.Q of 135, but a highly intelligent girl with an I Q. of 154 scored only 64 per cent in the space tests A girl of I.Q. 150 scored only 32 per cent for the space tests This girl said, " It's hard to think of these things ; it's easier if you've got words or figures." The writer asked her what she meant by " these things." She replied, " Oh, lines and solids, all these questions you've been asking us ; I like doing arithmetic best " " Do you not like geometry ? " I asked " I like finding out how many degrees there are in angles and things with numbers, but I don't like trying to see what lines are equal and things like that "

This reply was very illuminating. There seem to be some children who find reasoning by means of lines and spaces very difficult. It is only when they can put conclusions down in figures that geometry means anything to them This child in question enjoyed finding out the number of degrees in the angles of a triangle, given certain data, but disliked finding the relation between lines and angles when it was a matter of spatial relations, especially when there were no figures to aid in the spatial concepts.

Geometry as taught in schools cannot be dependent purely on spatial conception, it must involve number. Some teachers of mathematics deprecate the algebraic proof of such theorems as Pythagoras. But the pupils of such teachers, if these pupils find reasoning in spatial concepts difficult, will resort to algebraical geometry wherever possible. To them Pythagoras' theorem becomes $a^2+b^2=c^2$ They soon forget the proof, probably they have never quite understood it, but use the result expressed algebraically and enjoy the substitution of figures in this formula.

The higher correlation of Form H space tests with arithmetic, ·45 ± 12, compared with Form X's ·00 seems to show that in the case of Form X the children's ability to think in spatial form, to see spatial relations, was measured by the tests. This ability to find spatial relations had no connection with the ability to think in numbers. With Form H, on the other hand, they had done geometry for a year, and whilst the correlation 45 does not denote that every child who is good at arithmetic would be good at spatial reasoning, it does indicate that some kind of connection has been established.

The child begins geometry and very early in its study it uses a little arithmetic It measures to the nearest decimal of an inch or centimetre, it calculates the size of angles It counts the number of edges, faces and corners of a solid, and gets some numerical formulæ to connect the various spatial entities together

The child who is very good with figures becomes more interested in geometry when he finds numbers helping to connect up spatial entities. So, if in no other way, the child is helped to do his geometry better, because his interest has been aroused in the subject through his interest in number.

The space tests given to Form H, though not correlating more than ·47 with geometry when intelligence was held constant, showed that the children who had had practice in dealing with spatial relations had gained some experience from this practice.

The correlation, however, of 47 was not any higher than the correlation between arithmetic and English obtained from children's examinations for scholarship Mr X's examinations for English and arithmetic were carried out each year for about ten years, and when correlated by the grid method showed a correlation between arithmetic and English of about ·5

The correlation of ·45 between space tests and arithmetic in Form H then is below the correlation obtained between arithmetic and English.

The correlation of the space tests of H with their general intelligence quotients was ·42 ±·12, barely significant but indicating a higher agreement than that reached by X.

As in X, we have here an indication of the specific quality of the tests. Form H had, however, done similar tests in geometry and had been more used to directing their intelligence to such perceptions as those involving space and direction.

TABLE IV.

PARTIAL CORRELATIONS.

Group	$r_{ab\ c}$	$r_{ac\ b}$	$r_{bc\ a}$
A	40 ± 13	·35 ± 14	42 ± 13
B .	53 ± ·11	24 ± 15	34 ± 14
C .	52 ± 10	·22 ± ·13	·37 ± 12
D ..	·31 ± 10	28 ± ·10	·47 ± 08
E	75 ± 05	− 37 ± ·11	78 ± 05
F .	71 ± 06	− 12 ± 13	·54 ± ·09
G	40 ± 11	18 ± ·13	·67 ± 07
J ..	·29 ± 11	23 ± ·11	41 ± 10
K	·36 ± ·11	16 ± ·12	33 ± ·11
L ..	38 ± ·10	09 ± 11	25 ± 11
M .	·36 ± ·10	·34 ± 09	37 ± 09
Averages	46	15	·45

CORRELATIONS, HOLDING ONE ABILITY AND INTELLIGENCE CONSTANT AVERAGES.

$$r_{ab.c\ g} = 34$$
$$r_{ac.b.g} = 10.$$
$$r_{bc.a.g} = \cdot 43$$

Partial Correlations

Partial correlations were worked out between the three abilities taken in pairs, keeping the third constant. Table IV gives these partial correlations

It will be seen that whilst the average correlation between arithmetic and geometry was ·47, when algebra was held constant it was only ·15.

The correlation between algebra and geometry was reduced from ·59 to 45 when arithmetic was held constant

The correlation between algebra and arithmetic was reduced from ·60 to ·46 when geometry was held constant.

In Groups E and F the correlation between arithmetic and geometry becomes negative when algebra is held constant

Dr. William Brown found the correlation between arithmetic and geometry was reduced from ·28 to ·23 when algebra was held constant. He only tested one school—a boys' public school. In the boys' public school tested by the writer the correlation between arithmetic and geometry was reduced from ·51 to ·28 by holding algebra constant.

This correlation of ·28 ±·1 bears a close resemblance to Dr. Brown's ·23 ±·07.

The correlations were further examined to find the correlations between any two when the third and general intelligence were held constant.

It is seen in Table IV that the highest partial correlation holding one ability and intelligence constant is that between geometry and algebra holding arithmetic and intelligence constant. This may denote a slight factor common to geometry and algebra. From the point of view of a true regard of the qualities of mind contributing to these abilities, this small group factor is partly fictitious.

For example, in a school where the proof of Pythagoras has been taught in both the geometric and algebraical way, the pupils better at geometry would (if free choice were allowed) do it by geometry. The one better at algebra would use the algebraical proof. Both might get full marks on a geometry paper for this question. The one would have gained these marks by using his ability in geometry, the other very largely by using his ability in algebra.

(This article will be completed in the next issue, when French and German résumés will also be given.)

THE SPEARMAN VISUAL PERCEPTION TEST (PART I), WITH PANTOMIME DIRECTIONS.

By SETH ARSENIAN
(*Teachers College, Columbia University*)

I.—*Description of the test* ·
  (1) *Administration of the test*,
  (2) *Timing*,
  (3) *Scoring*.
II.—*Results*
  (1) *Age norms* ;
  (2) *The frequency distribution of the scores* ;
  (3) *The performance of the natio-racial groups*,
  (4) *The performance of the sexes*,
  (5) *The reliability of the test*,
  (6) *Correlation with other tests*.
III.—*Directions for administering the test*

I.—Description of the test

In 1932 and 1933 Professor Spearman developed and published[1] in experimental form his Visual Perception Test intended for the measurement of the ability in eduction of relations and correlates, which ability, according to his theory, underlies what we call "intelligence." The test consists of three parts, of which the first, to be dealt with in this article, purports to measure the ability in the eduction of relations

The Spearman Visual Perception Test, Part I, to be referred to in the rest of this article as SVP for the sake of brevity, consists of six Forms and a fore-exercise known as Form 0. The test material consists of geometrical figures and patterns enclosed in squares in twelve rows to each page The left-hand page is divided into two vertical sections labelled "Right" and "Wrong"[2], there are three and occasionally four figures in each row and under each section named above. The figures in the "Right" section for each row are alike in some way, in relation to the figures on the same row in the "Wrong" section, they are short, solid, single, dotted, right-angled, etc. The testee is expected to examine each row, find out the attribute, relation or denomination common to the figures in the "Right" section which is at the same time absent in the figures contained in the section labelled "Wrong" and mark appropriately the ten figures presented in a random order in a row on the opposite page. Let us take, for example, the row A of Form I[1]: in the section labelled "Right" are presented in three squares three lines which are all short in comparison with the three lines in each of the squares under the section "Wrong" Shortness, therefore, is the attribute to be sought in the ten figures in row A of the right-hand page

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[1] National Process Co., New York, U S.A.
[2] See diagram on page 289.

Here, a stroke or I is to be placed in the small rectangle at the lower right-hand corner of each square that contains a short line, and a zero in each rectangle of the square containing *not* a short line. There are ten figures in each row and twelve rows to each Form, making a total of 120 figures to be marked for each Form, and since there are six Forms, the grand total of all figures to be marked is 720 At the beginning of each Form both the figures and the relations involved are simple They become, however, progressively more difficult and complicated.

As originally planned by Professor Spearman, the principles involved in taking this test are verbally explained and demonstrated by the use of Form 0, the last six rows of which are used as a pre-exercise, seven minutes are then allowed for work on each of the six Forms of the test.

In connection with a study on bilingualism[2] it was deemed necessary to administer the SVP with pantomime instead of verbal directions. The changes introduced in the administration, timing, and the scoring of the test as well as some of the results will now be reported.

(1) *Administration of the Test.*

The SVP with pantomime directions was first administered by the writer to a graduate class in Mental Testing at Teachers' College, Columbia University. It was then given to pupils in three different grades in Public School 157, Manhattan. After this preliminary experience with the test certain changes in the administration, timing and scoring were decided upon.

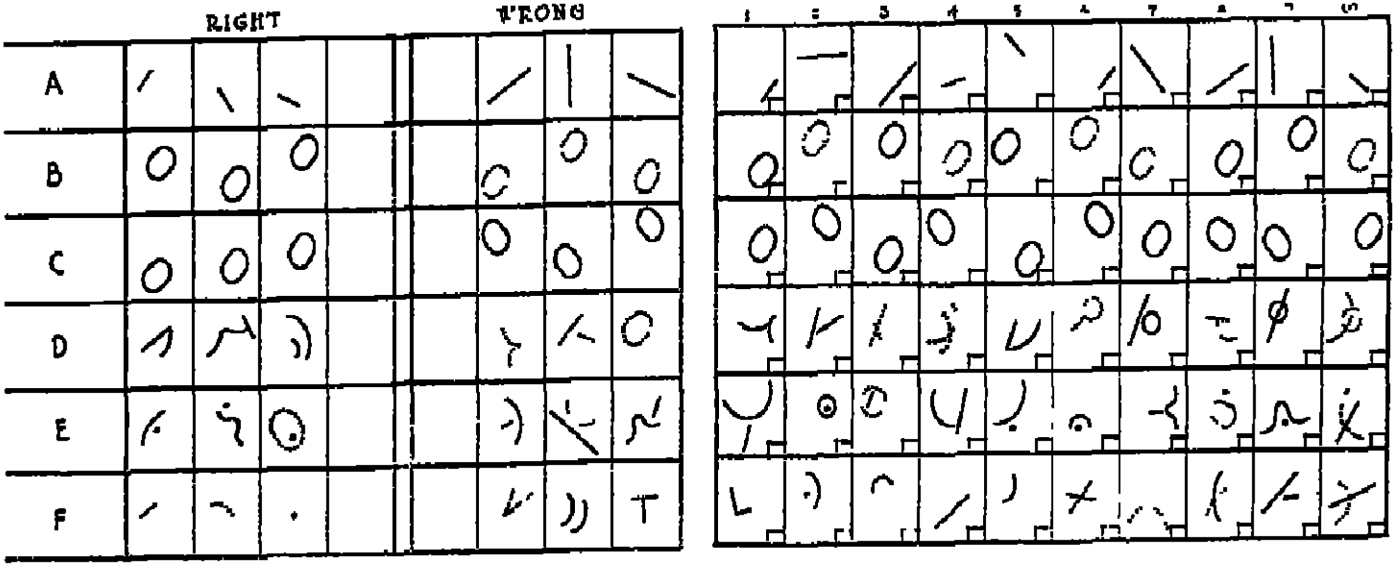
It was found that Form 0, intended originally for demonstration and pre-exercise, was too simple and did not include exercises sufficiently characteristic of the rest of the test This conclusion was in accord with the results reported by Dr. Joseph Zubin,[3] who in 1932 gave the SVP with verbal directions to two seventh-year classes and found that the

[1] See diagram on page 289

[2] SETH ARSENIAN *Bilingualism and Mental Development* (Bureau of Publications, Teachers College, Columbia University.) Much detail about the test, which cannot be presented in this article, will be found in the reference cited above

[3] Dr Zubin kindly allowed the writer to see this monograph, which was prepared for Professor Spearman.

FORM I (PRACTICE ROWS)



class which had the advantage of the explanation of the test items on Form I achieved higher scores than the class to which the test was given under standard conditions, i e., Form 0 was used for demonstration and pre-exercise, and that the correlation of SVP scores with scores on the National Intelligence Test taken earlier by these pupils was higher for the first than the second group The elimination of Form 0 and the use of Form I for demonstration, in addition to giving the testee greater familiarity with the test, helped shorten the time for testing On the bases of these considerations the change as described was adopted. The full directions in administering the test are given at the end of this article.

(2) *Timing*

In Public School 157 SVP was given to two fifth-year classes allowing seven minutes time on each Form for one and five minutes for the other group. The group which had seven minutes had slightly higher score, however, the correlation between SVP and N I T. (M.A) was practically identical for the two groups. It was, therefore, decided to allow five minutes working time on each Form instead of seven minutes as originally proposed It was learned later that Professor Holzinger of Chicago and Mr. Z L. Smith who administered the SVP at Moosehart had also allowed five minutes working time for each Form [1]

(3) *Scoring.*

Three methods of scoring were suggested: (1) counting the correct number of strokes; (2) counting the correct answers, both strokes and zeroes; (3) counting the total number of correct answers both strokes and zeroes and subtracting from it the wrong responses. The test papers of the preliminary examination at Public School 157 were scored by the three different methods stated above. It was found that children who without understanding the test items marked them nevertheless either 1 or 0 were benefited unduly by the use of the first two methods of scoring. These were discarded, therefore, and the third method, employed also by Professor Holzinger,[2] was adopted. A negative score on each Form was called 0

II.—RESULTS.

The test in its final form was administered by the writer to 2,830 children attending at the time of testing Public Schools 16 and 176 in Brooklyn, New York Approximately 90 per cent of the pupils were of

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[1] Private communication.

[2] Private communication

Jewish parentage in the first school and of Italian parentage in the second school. All pupils in grades 4B to 8B were tested as well as pupils at age ten or above who were found to be in the ungraded classes or in classes below 4B.

(1) *Age Norms*

The number of children tested at each age, the averages and the standard deviations are given in the table below.

Age	*Number of Pupils*	*Mean*	*Standard Deviation*
9	263	122·84	63·37
10	602	128·27	75·30
11	563	150·59	68·30
12	604	172·32	69·53
13	540	181·56	65·26
14	258	179·04	58·59

In examining these figures note should be taken of the fact that the samples at ages nine and fourteen are not entirely representative. The brighter fourteen-year-old children, having progressed more rapidly through the grades, have finished the eighth-year elementary school, and moved to high school or left the school entirely. They are not included in this study. On the other hand, it is only the brighter nine-year-old children who have advanced to the 4B grade and are, therefore, included in the study. The average raw scores for these ages bring this fact out in a striking manner.

The age averages in raw score are represented graphically in Graph I. With the exception of the ages nine and fourteen the trend indicated conforms closely to the expected curve for mental development of children of these ages. The curve of mental development on the Pintner Non-Language Test which was also given to these children is similar to the curve indicated in the graph.

(2) *The Frequency Distribution of the Scores.*

The frequency distribution of the scores is represented in Graph II. It will at once be noticed that there are more persons with low scores on SVP than would ordinarily be expected of the frequency of scores of an intelligence test devised for these ages All pupils in the ungraded classes and, proportionally, more younger than older children, fall within this low score group. It is evident that the test in its present form of administration and scoring is difficult for the dull and young children.

The average score for the entire population of 2,830 cases is 156·40 with a standard deviation of 73 20 The median is 167 10. Applying the usual formula $3\,\frac{(\text{Mean-Median})}{\sigma}$ we receive —·44 as the figure for skewness of the frequency curve.

(3) *The Performance of the Natio-racial Groups.*

In the total population tested there were 1,152 children of Italian and 1196 children of Jewish parentage. The children were all born in the United States The figures indicating the performance of these two natio-racial groups are given in the accompanying table

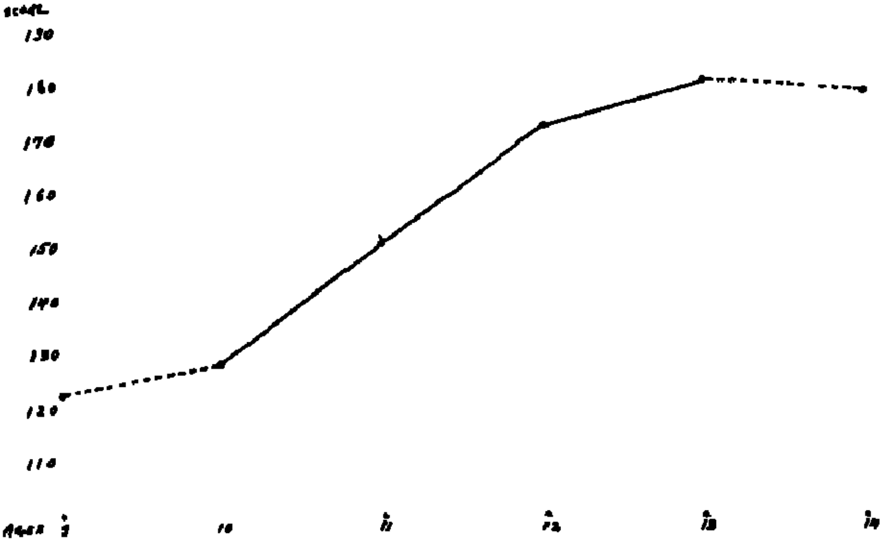
	Italian			*Jewish*		
Age	*Number*	*Mean*	*Standard Deviation.*	*Number*	*Mean*	*Standard Deviation*
9	72	124·30	62·40	156	122·50	65·60
10	231	110·70	74 60	287	146 70	70·80
11	211	138·70	70 40	266	179 90	67 20
12	238	161·29	71·36	260	182 95	66·30
13	249	171·50	66·00	183	192·90	59 40
14	151	177·30	71·00	44	187·30	47·40

With the exception of age nine, at every age the average performance of Jewish children is superior to that of the Italian children At ages ten, eleven, twelve, and thirteen, where the samples are larger and more representative, the difference in favour of the Jews is more than three times the standard deviation of the difference and therefore statistically significant. The parents of these Italian children emigrated to this country from Southern Italy and Sicily. The Jews in this study came from Austria, Hungary, Galicia, Poland and Russia. These two samples are not necessarily representative of *all* Italians or Jews in this country or elsewhere

GRAPH I

AVERAGES FOR AGES 9 TO 14 (2,830 CASES).

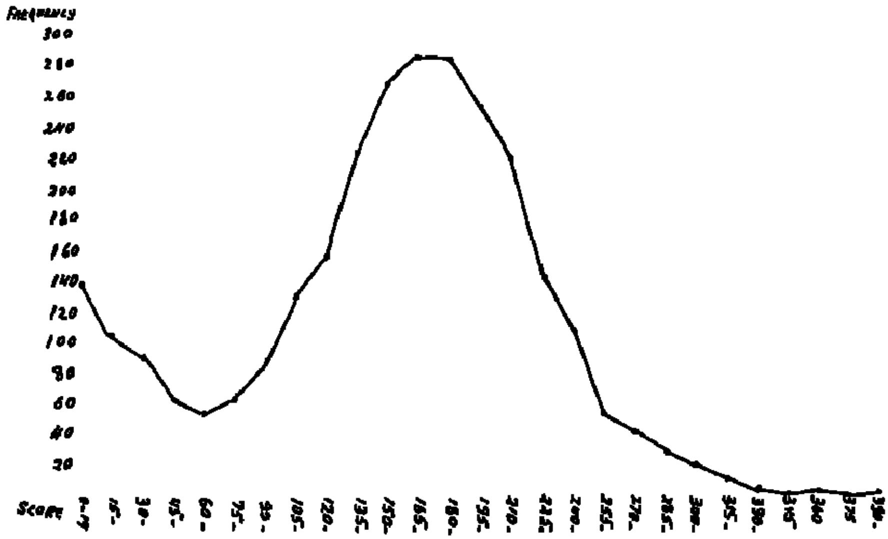
SPEARMAN VISUAL PERCEPTION TEST, PART I, WITH PANTOMIME DIRECTIONS



GRAPH II.

DISTRIBUTION OF SCORES (2,830 CASES)

SPEARMAN VISUAL PERCEPTION TEST, PART I, WITH PANTOMIME DIRECTIONS.



(4) *The Performance of the Sexes.*

The averages and the standard deviations on SVP of boys and girls at each age and within each natio-racial group were calculated and reported elsewhere.[1] The differences between sexes are not statistically significant.

(5) *Reliability of the Test.*

The reliability of the test was calculated by the split-half technique The total of the scores on Forms 2, 4, and 6 was correlated against the total score on Forms 3 and 5 for 589 children of age twelve The reliability coefficient for the half test was ·794 with P.E. of ·0101 By applying the Spearman-Brown formula, the reliability coeficient for the entire test was found to be 882 with a P E of ·0062. Professor Holzinger reports a reliability coefficient of 86 for the same test with verbal directions for 118 cases (near twelve years old)[2]

(6) *Correlation with other Tests.*

Both SVP and the Pintner Non-Language Intelligence Test were administered to 589 twelve-year-old children The correlation between the raw scores on the two tests for the population mentioned was ·610 with P.E. of ·0174

Four hundred and sixty-nine mostly Jewish children of grades 6 and 7 who had taken the SVP were also given the Pintner Intelligence Test—a verbal test. The correlation coefficient between the scores of the two tests was ·441 with P.E. of ·0251.

Two adult groups of 40 each, equated person per person on age and score on the Thorndike CAVD test, were given the SVP by means of verbal and pantomime directions. The correlation between CAVD scores and scores on SVP administered by verbal directions was 4797 and between CAVD scores and the scores of the SVP administered by pantomime directions was ·5808[3]

III.—DIRECTIONS FOR ADMINISTERING THE SPEARMAN VISUAL PERCEPTION TEST, PART I.

(*Non-Language Form.*)

The first six rows (A to F inclusive) of Form I[4] of the test are used for demonstration. For each row two demonstration cards are prepared.

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[1] *Bilingualism and Mental Development*, op. cit

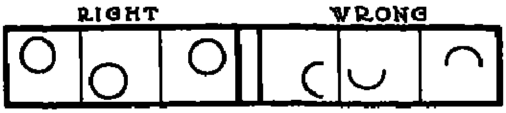
[2] Private communication

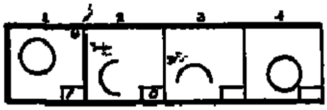
[3] LORGE, I., and ARSENIAN, S. *A Comparison of the Scores on the Spearman Visual Perception Test, Part I, Administered by Verbal and Pantomime Directions* To be published

[4] See diagram on page 289

one containing the figures on the left, and the other containing those on the right-hand page of the test blank. The figures should be drawn on these cards in India ink and should be exact copies of the original with the exception of their size, which should be approximately twelve times the original. By attaching two Dennison cloth suspension rings these cards can be hung from hooks or nails on the upper blackboard rim in an ordinary classroom or in a high central place in a room where the test is to be given so that they can be seen clearly by everybody in the room.

The test should be given with the help of an assistant. The administration of the test will require rehearsal and practice on the part of both examiner and assistant. On entering the classroom first hang the cards from the wall six in each of the two groups, and next to each other just as they would appear on the page of the test, and in the order from A to F. The Form A should be covered at this time with another card of the same size to prevent the children from seeing the test items





After the cards are hung on the wall by examiner and assistant, the examiner draws on the blackboard the ten figures given as samples on the front page of the test. These consist of three squares, each containing a circle, on top of which is to be found the word *right*; three squares, again each containing a semi-circle, on top of which is the word *wrong*, and four squares in a row, the first and the fourth containing a circle each and the second and the third containing a semicircle each. In the lower right-hand corner of each of the last four squares there is a small rectangle the first two of which are already marked 1 and 0 and the last two are blank. In drawing these figures on the blackboard they should be enlarged to a size preferably twelve times the original, to be seen easily by everyone in the classroom and should be placed under the demonstration cards so that *right* and *wrong* sections fall under the first group of cards and the practice row under the second group of cards. While the examiner does this, the assistant distributes the test blanks and has the children fill out the information called for on the first page (name, age, grade, etc.).

When the children have all filled out the first page, the examiner, after making sure that each child is supplied with two pencils, starts the test as follows, EXAMINER "This is an exercise that we give to deaf children or children who do not know English; for that reason I am not going to talk while giving this exercise to you. See how well you can understand what I tell you to do without using words, and do the exercise. Follow my actions carefully."

This short introduction is sufficient to orient the testees to the demonstration in pantomime. Standing on the right of the demonstration cards, with the help of a long ruler, trace the outline of the three circles in the *right* row and emphatically point to the word *right*.[1] Then, trace the three semi-circles and emphatically point to the word *wrong*. Next, trace the circle No. 1 in the practice row, then trace (always with the long ruler) the outline of each of the three circles in the *right* row, nodding approval each time. Point to the circle No. 1 in the practice row and immediately to the word *right*, thus showing that the circle is *right*. Then, take a piece of chalk and put a stroke in the little rectangle at the lower right-hand corner of the square in which circle No 1 is enclosed Point with ruler to the stroke and then to the word *right*, thus showing the connection between the two

Trace the outline of the semi-circle, No. 2 in the practice row, and trace the three circles in the *right* row each time showing a disapproval by a negative movement of the head and a little frown. Then, trace each of the semi-circles in the *wrong* row and show approval by nodding the head. Point to semi-circle, No. 2 in practice row, and to the word *wrong*. Take chalk and put a zero in the little rectangle of this square Point to the zero and to the word *wrong*. Next, merely point, without tracing the outline, to the semi-circle No. 3 in the practice row and point to each of the three circles in succession, from left to right in the *right* row making the usual sign of disapproval. Then point to the semi-circles in succession in the *wrong* row making the sign of approval. Point to semi-circle No. 3 in the practice row and to the word *wrong*, take chalk, put a zero in the little rectangle. Put down ruler. Take a copy of the test and with a pencil show the place where children are to place a zero, and with a movement of the hand inform them that they are to put a zero in the little rectangle. Allow ten seconds. Assistant and examiner should see that children place the zero in the right place With a tap of the ruler on the desk call the attention of the children and place pencil on desk showing,

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[1] For the sake of emphasis, particularly in the lower grades, it is advisable to call on one of the children to read this word and the word *wrong* when the latter is pointed to

The words *right* and *wrong* and the introductory paragraph can be put into any language desired, and with this change the test will be suitable for administration in non-English speaking countries thus, that they are to do the same. Now, point to the circle No. 4 in the practice series and point to each one of the circles in the *right* row and nod approval at the end. Point to circle No 4 in the practice row, then to the word *right*, take chalk and place a stroke in the rectangle. Put ruler down, take pencil and a copy of the test, holding the front page towards children, show where they are to place the stroke, and have them do it

Erase the figures on the blackboard. Take down the blank cards and expose thus the enlargement of row A for the demonstration. Take a copy of the test and holding it in front of the class turn two pages to Form I and place it on the desk without folding Examiner and assistant should see that children turn to the proper page and do not fold the test blank.

Holding the open page of the test in front of the class with finger run along the row A on the test blank and point to the two cards showing that the cards represent the row A

Place blank on desk, take ruler and point to each one of the three short lines under the word *right*, then point to the word *right* Do the same with the three long lines under the word *wrong*, and point to the word *wrong*. Pointing with finger this time to the three short lines draw with chalk a short line on the blackboard under the *right* lines Similarly, draw a long line under the *wrong* lines With the use of the thumb and the forefinger make a measuring movement of the short line and the long line drawn on the blackboard, thus showing the difference in length between the two. Then point successively to the short line drawn on blackboard, to the short lines on the demonstration card just above, and to the word *right*. Do the same for the long lines and the word *wrong*

Now point with ruler to line No 1 in the practice series, then to the three short lines under the word *right* and nod approval Point again to line No. 1 in the practice series and to the word *right*, with pencil indicate that a stroke should be placed in the little rectangle of square No 1 (The correct strokes and zeroes have already been placed in each of the rectangles of the squares of all the six cards representing the six rows of Form I). Take the test blank holding it in front of the class and show the children where they are to put the stroke and have them do it The assistant moves around and sees that every child puts the stroke in the correct rectangle Then tap with ruler and place pencil down having everyone of the children follow suit The children should definitely get the idea that they are to place the pencil on desk with the tap of the ruler. This will greatly help the administration of the test.

Now, point to line No. 2 in the practice row, then point to the three short lines on the card under the word *right*, and the one short line on the board and show disapproval. Point again to the line No. 2 and then to the three long lines on the card under the word *wrong*, and the one long line on the board, nod approval Point to line No. 2 and to the word *wrong*. With pencil show that a zero should be placed in the little rectangle of the second square in the practice row With a movement of the hand inform the testees that they are to put a zero in the rectangle After ten seconds tap with ruler. This is the signal for the children to put their pencils down and every child should have learned it by this time. Now, proceed *in the same manner for each of the figures in the rest of this* row. When the testees have marked the rectangle in square No. 10 tap with ruler to have them put their pencils down.

Take down the two demonstration cards of row A (It is well to arrange so that the examiner takes down one of the cards while the *assistant takes down the other.* This procedure will expose the two parts of the row simultaneously and cut down the time for the entire demonstration.) Take the copy of the test, holding it with Form 1 exposed to the class, with the forefinger run along row B and turning to the cards, indicate that they represent row B Standing to the right of the cards with ruler trace rapidly the outline of the three figures in solid line in the *right* section and point to the word *right*. Do the same for the dotted figures in the *wrong* section and point to the word *wrong*. Pointing to the figures in the *right* section again draw underneath on the blackboard a solid figure similar to the ones given Similarly, draw a dotted figure. Point to the solid figure just drawn and to the word *right*. Point similarly to the dotted figure just drawn and to the word *wrong*, thus indicating the difference between the two figures, which difference accounts for one of them being *right* while the other is *wrong*.

Trace with ruler the first figure in the practice row, then trace the three solid figures in the *right* section, nod approval, point to the three solid figures and the word *right* above them, then point to the figure in square 1 of the practice row and to the word *right*, take chalk and make the movement of placing a stroke in the rectangle of square 1 of the practice row Take the copy of the test exposing it to the class, show with pencil that they are to place a stroke in the appropriate rectangle. The examiner looks on the blanks of some testees in front row of the class to see that the directions are followed. The assistant moves around the classroom and helps any children who may need assistance Tap with ruler to have children put their pencils down.

With ruler trace the figure in square 2 of the practice row, then trace the three solid figures in the *right* section, show disapproval, point to figure 2 again, then to the word *right*, show disapproval, trace the figure 2 again, then trace the three figures in the *wrong* section, nod approval, point to the three dotted figures and to the word *wrong*, then point to figure 2 and the word *wrong* nodding approval, take chalk and make the movement of placing a zero in the rectangle in square 2 containing figure 2. Hold the copy of the test blank in front of class and with pencil indicate that they are to place a zero in the rectangle. Proceed as before

With ruler trace figure 3 in the practice row, then trace the three figures in section *right*, nod approval, point to the word *right*, nod approval, take chalk and make the movement of placing a stroke in the rectangle of square 3 containing the figure 3. Have the children place a stroke in the rectangle as before. Now, holding the test blank in front of the class indicate by placing the end of the pencil in each of the remaining rectangles of this row successively that they are to mark them themselves. Give the sign to have them start doing it immediately. The assistant moving around the classroom should give any help necessary. Ordinarily, the children have no difficulty in understanding this direction

Place the long ruler across the rectangles already marked on the demonstration card so that some pupils do not copy it. When the children have finished marking the row take the ruler down and point to the zero in the rectangle of square 4, then point to the pupils to check the mark which they have placed in this particular rectangle. It will at times be helpful in this first instance if the examiner goes to one or two pupils sitting in front of the class and with finger or ruler points to what they have placed in the rectangle and to what should be there according to the demonstration card This can easily be done by pantomime without using any words. Then point successively to each rectangle in the row and have children check their markings. Tap with ruler to have children put their pencils down.

With the same procedure as before take the cards of row B down, indicate that the cards now exposed are the reproduction of row C, show that the difference between the three figures under the word *right* and *wrong* lies in the fact that they point in opposite directions. To show this, step to the left of the cards and by stretching the right arm point to the direction of the three figures in the *right* section. Then stepping to the right of the cards stretch the right arm again showing the direction of the three figures in the *wrong* section. Show by immediately pointing to the appropriate words that one direction is *right* and the other direction is *wrong*. Following the same procedure as in row B have children mark the rectangles of the three first squares by following the examiner's directions in each case, then similarly have children mark for themselves the rectangles in the rest of the squares and have them check as before.

Follow this same procedure in demonstrating rows D, E, and F. In D draw a straight solid line on blackboard under the figures in the *right* section, and a dotted line under the figures in the *wrong* section calling attention that the difference in this case lies in the solidness or the dottedness of the figures, without any reference as to the form or the particular pattern.

In E point to the heavy dot in each of the figures in the *right* section and the absence of it in the *wrong* section, calling attention that here lies the difference between the *right* and the *wrong* figures. Do this also by placing a heavy dot on the blackboard under the figures of the *right* section and a line under the figures of the *wrong* section.

In F put on the blackboard one line under the figures of the *right* section and two lines under the figures of the *wrong* section, and raise one finger for everyone to see while referring to the *right* section, and two fingers while referring to the *wrong* section, thus indicating that the difference between *right* and *wrong* lies in oneness and twoness of the figures in each square.

When the children have finished marking and checking with the cards the practice row F tap the ruler to have them place their pencils down. Take the cards of row F down, holding the test blank in front of the class, turn one page, have the class do the same, taking the pencil in one hand indicate that they are to mark the figures of each row of this page, have them take pencil and by a swift movement of the hand have them start. Start the stop-watch. Examiner and assistant should move around quietly and see that each child works properly without giving or receiving help from neighbours. At the end of exactly five minutes give the usual tap, now familiar to the children, to stop and place their pencils down

The same procedure is used in starting the children on the other Forms of the test or stopping them, with the exception that at the end of Form IV two minutes are allowed for rest. During this period the windows are opened for more fresh air, the pupils are asked to stand up, and with the examiner leading they do a few stretching, inhaling, and exhaling exercises.

Children taking this test, unless they are very dull, immature, or exceptionally inattentive, have no difficulty in following the pantomime directions. It is necessary, however, that the examiner have the whole class under full control and allow no seconds to be wasted.

The examiner and assistant should be thoroughly trained and conversant with each movement before giving the test. The examiner should always be on the alert, the different movements in demonstrating the test should follow each other with due emphasis and yet with rapidity, there should be no hesitations otherwise the time consumed for the demonstration will be too long and fatigue the children. The working time on each Form of the test is five minutes The demonstration should be completed in twenty minutes. One usual class period of fifty minutes should be ample time for giving the test.

RÉSUMÉ

LE TEST SPEARMAN DE LA PERCEPTION VISUELLE
1re PARTIE AVEC DES INSTRUCTIONS PAR PANTOMIME

Le test Spearman de la perception visuelle, 1re partie, fut inventé par le Professeur Charles Spearman pour mesurer la capacité de saisir les rapports

Le test, tel qu'il fut d'abord construit, dépend pour son application des instructions verbales Pour les buts d'une étude des enfants bilingues l'auteur de cet article a adapté le test à une application qui n'utilise pas le langage

Le test, dans cette forme modifiée, fut appliqué à 2830 enfants, âgés de neuf à quatorze ans, dans les classes 4B à 8B de deux écoles primaires publiques de Brooklyn, New York. On donne la moyenne pour chaque âge, aussi bien que des comparaisons entre la performance des deux sexes, et entre celle de 1152 enfants italiens et celle de 1196 enfants juifs La performance des Juifs se montrait en général supérieure à celle des Italiens.

La coefficient de validité du test est 882 avec une erreur probable de 0062

La suivante est la corrélation de ce test avec d'autres

Avec le test de Pintner qui n'utilise pas le langage . ..	·610
Avec le test verbal de Pintner	441
Avec le CAVD test de Thorndike	581

On donne les instructions pour l'application du test sans emploi du langage

ZUSAMMENFASSUNG

DER SPEARMAN'SCHE SEHWAHRNEHMUNGSTEST, ERSTER TEIL, MIT PANTOMIMISCHEN ANWEISUNGEN

Der Spearman'sche Wahrnehmungstest, I Teil, wurde von Professor Charles Spearman aufgestellt, um die Fähigkeit im Erkennen von Verhältnissen zu messen Der Test, wie er ursprünglich aufgestellt war, beruht bei seiner Ausführung, auf mündlichen Anweisungen Im Zusammenhang mit einer Untersuchung über Zweisprachigkeit hat der Verfasser den Test zur Anwendung ohne Worte umgearbeitet, wobei der Test ohne das Mittel der Sprache angewandt wird

Der Test ohne Sprache wurde 2830 Kindern im Alter von neun bis vierzehn in Klassen 4B bis 8B in zwei Volksschulen in Brooklyn, New York gegeben Altersnormen und Vergleiche zwischen den Leistungen der Geschlechter und zwei Gruppen von 1152 italienischen und 1196 jüdischen Kindern werden gegeben Im allgemeinen fand man, dass die Leistung der Juden besser war als die der Italiener

Der Zuverlässigkeitskoeffizient des Tests ist ,882 mit einem Prozentirrtum von ,0062 Die Korrelation des Tests mit anderen Intelligenzprüfungen ist wie folgt:

Mit Pintners Intelligenzprüfung ohne Sprache	,610
Mit Pintners Intelligenzprüfung (mündlich)	,441
Mit Thorndike CAVD Test	,581

Die Anweisungen für den Gebrauch des Spearman'schen Sehwahrnehmungstests ohne Sprache werden gegeben

THE DRIVES WHICH DETERMINE THE CHOICE OF A CAREER.

By MAGDALEN D. VERNON.
(*From the Cambridge Psychological Laboratory*).

I.—*Introduction*
II.—*Preliminary description of the drives operating in the choice of a career.*
III.—*The main enquiry into the drives of students.*
  (1) *Method of enquiry.*
  (2) *Treatment of statements.*
  (3) *Method of functioning of drives as shown by statements.*
    (*a*) *Cases actuated principally by social conformity.*
    (*b*) *Cases actuated by drives other than social conformity.*
IV.—*The distribution and inter-relationship of the drives.*
V.—*Summary and conclusions.*

PART I.

I.—INTRODUCTION.

THE enquiry described here was undertaken in order to obtain some information as to the more important drives or tendencies to action which function in determining the individual's choice of a career or occupation in life. The word "drive" is used in this connection for the following reasons. There can be no doubt that in the individual there exist tendencies more or less specific in nature which are experienced, consciously or unconsciously, as if they "drove" him to act in this way. Any one tendency may function over a considerable period of time, and may express itself in a large number of different pieces of behaviour But it is possible to observe a certain consistency between these pieces of behaviour of such a nature that they can be said to demonstrate the operation of a particular drive, for instance, a drive towards safety or security. The drive is thus defined roughly in terms of the state towards which it impels the individual. In general these drives are affectively toned, carrying with them some experience of desire; but the experiences of desire or drive are almost always unclear in consciousness The drives do, of course, carry with them conscious experiences which are usually termed the motives or the "reasons" for the activity, and these motives or reasons can be verbally formulated. It would be out of place to discuss here the degree of rationalization which takes place in this formulation, though some evidence on this point may appear in the subsequent discussion To avoid this question, the word "drive" is used, and it should be taken to mean the type of tendency described above, with or without conscious representation.[1] Although the same drives are commonly found among large numbers of people, it is not assumed that any drive is either innate or of universal occurrence, thus it may or may not be instinctive in origin.

In this paper I do not seek to discuss all the drives that may function at any time in the life of the individual, but merely those which appear to operate in directing him towards one particular form of activity, his career or occupation. Clearly this activity is of very great importance, if we consider it in its broadest aspects, both positively in the search for an occupation or occupations, and also negatively in the rejection of other occupations Consequently, it is probable that the individual's major drives may operate in this choice—or it may be in his refusal to choose an occupation. And, moreover, whatever the individual's knowledge and comprehension of his own abilities, and of the abilities demanded by the possible occupation, such knowledge can at most guide his choice, and cannot motivate or "drive" him into making it This knowledge can function, together with the appreciation of a number of environmental factors, only in so far as they stimulate to action some important and powerful drive or drives. But the greater the intelligence of the individual and the higher his position in the social scale, in general the more careful and prolonged his consideration of his future occupation and way of life. Consequently it may be supposed that in such cases there would be full opportunity for the operation of these drives in directing the individual's choice. Yet in so far as the drives are only vaguely conscious, the individual himself will not be fully aware of them and will be unable to describe them verbally to another person. Thus anyone who wishes to understand the manner in which the individual's choice is determined by such drives must use some indirect method of discovering and observing them. Such understanding might be obtained from prolonged observation of the individual in a variety of situations, but since this method is impossible to the experimentalist, the objections to it need not be discussed. His observations must be carried out more briefly. He may use some combination of the various tests which have been developed in connection with vocational guidance Yet these in the main test cognitive and manipulative abilities, and may make little appeal to fundamental drives. Indeed, it is very difficult to detect the functioning of the drives in any purely experimental situation, at least in the more intelligent and sophisticated individual. But if he cannot study the actual operation of these drives, the experimenter may yet be able to detect their existence and gauge their strength by learning of their expression in the individual's ordinary everyday existence. For they will function in determining his interests and pursuits, his attitude towards these pursuits and his way of describing them. Thus if the individual be asked to describe these interests and pursuits, past and present, vocational and subsidiary, the experimenter may obtain indirectly some knowledge of the main drives which link up a number of discreet, perhaps apparently inconsistent, activities Moreover, the actual nature of these may be less diagnostic than the manner in which they are described and the reasons given for undertaking them Such knowledge may be obtained from an interview in which certain questions are asked as to the individual's interests and pursuits, and in which he is encouraged to describe them in his own words.

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[1] Thus it should not be equated to the type of motive given for adopting the teaching career, discussed in an article in this *Journal* (Vol. IV, p 237, 1934)—*An Enquiry as to the Reasons for the Choice of the Teaching Profession by University Students*, by C W. Valentine. Such a study of motives presents a different, though related, aspect of the general problem.

II —PRELIMINARY DESCRIPTION OF THE DRIVES OPERATING IN THE CHOICE OF A CAREER

As a preliminary to the main investigation along these lines, which for the sake of convenience was confined to women students, enquiries were made personally from various older women who had had considerable knowledge of and experience in dealing with girls and students, in order to ascertain their ideas as to the main interests and pursuits of girls. It was hoped that their information on these might throw some light on the nature and occurrence of underlying drives No definite scheme of questions was used, the person interviewed was asked for general opinions as to careers, interests, pursuits, etc, and when possible as to the reasons for choosing these. But no questions were asked and no direct suggestions were made as to the existence of drives such as those described below The women questioned included university tutors, head mistresses, juvenile employment officers, a factory and a Board of Education inspector, and psychologists engaged in industrial psychology and vocational guidance This was not assumed to be a representative sample of women in such professions. Neither, of course, was it assumed that their opinions had the validity of factual statements ; obviously they were affected by personal and professional bias But they did indicate indirectly some of the possible drives which may actuate girls in their choice of a career. It was possible to draw up from their statements (which for lack of space cannot be printed here) descriptions of these drives. These descriptions, and the actual list of drives, is of course only indicative, not final or delimitative. The frequency and importance of the drives appears more clearly in the information which is presented later.

The following appear to be the main drives ·

Social conformity—the drive towards mingling with one's fellows, behaving in a manner likely to be accepted by them, winning their approval, doing whatever job is fashionable, is suitable to one's social class, is approved by one's friends and relations

There seems to be little doubt that this drive is enormously powerful in all social classes and at all ages, but possibly girls are particularly prone to it during adolescence. There was some difference of opinion as to the social group or groups to which these girls most frequently and readily conformed Those not engaged in school teaching frequently attributed to the schools a harmful influence in encouraging particular types of conformity. It was considered that they inculcated an academic bias, which encouraged girls to take up university and/or teaching careers who were in fact quite unsuited for these Sometimes the influence was attributed to a particular head mistress or assistant mistress But other influences were quoted That of the parents was of course very strong, and was sometimes stigmatized as unhelpful in that it dissuaded children from launching out into careers which the parents considered to be insecure or socially undesirable.[1]

There were also waves of fashion in careers and occupations among students, school-girls, and girls at work, these fashions exerted considerable influence on the direction of choice [2]

This type of conformity under pressure of social influences should not be confused with adaptability towards the social environment in general In the latter case, emphasis is laid on acceptance of and cooperation with different and unfamiliar social settings, not on conformity towards a habitual setting or slavish imitation of a familiar activity It may be connected with the following drive.

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[1] The influence of parents and teachers in persuading children to take up teaching as a profession is shown very clearly by F. M Austin in *An Analysis of the Motives of Adolescents for the Choice of the Teaching Profession* (*Brit J Educ Psychol.*, 1931, I, 87) Nearly half the children who answered the questionnaire in this experiment gave this influence as a reason for deciding to take up teaching But see also footnote, p 303

[2] It was stated that among working class girls the choice of occupations was largely dictated by their recognized social status Occupations were graded in status, and each girl chose that of the highest status to which she thought she could attain

Humanist, humanitarian—the drive towards understanding the way in which people live, work, think, either as individuals or groups, towards meeting people of all kinds, understanding and responding to them, towards showing them sympathy and affection, of an impersonal rather than a personal kind, very frequently accompanied by a desire to help and protect; and a maternal attitude towards young children.

It is often possible to differentiate those individuals who are mainly characterized by this maternal, protective attitude, from those in whom the drive takes the form of a more generalized interest in human affairs and human contacts—a desire to understand, without necessarily any desire to help In particular, the latter form of the drive rarely appears in girls, at least before the age of sixteen to seventeen, it seems to mature during university life. But the first form may appear in school children while quite young, as a desire to take up medicine, sick or child nursing, or kindergarten teaching. This desire is generally very persistent, and often leads to fruition. A great desire to do work with animals might also indicate a form of the protective drive, but it may also include a good deal of phantasy (see p. 308).

Activity—the drive towards activity and work, towards adequate functioning, the employment of all the individual's energies and abilities, both mental and physical, in generalized activity not necessarily directed towards any specific end.

This seemed to be widely distributed, appearing particularly in the more energetic and well-adapted, and in those of higher social class It was less easy to gauge the existence of this drive in girls lower down the social scale, since with them working was a necessity, not a choice Actually among these girls activity was less marked while at school.

The drive towards activity when it existed was general rather than specific. Girls who strongly desired any particular career or occupation seemed to be comparatively rare (apart from those already mentioned who were actuated by the protective drive). Their ideas about careers changed a good deal from time to time Often the particular subject selected for study at the university was chosen because the girl had done better in it at school than in any other subject, and not necessarily because she was most interested in it. But it is probable that those with definite artistic abilities experienced a specialized activity drive in this direction while quite young, though they were few in number. Cases were quoted also of specialized drives towards certain manipulative activities; but it was hard to say if these were important or persistent.

Freedom and *independence*—the drive towards free and independent activity, leaving school, getting out in the world, freedom from parental control

This drive operated in all social classes, but seemed, according to the statements made, to appear most clearly lower down the social scale, possibly because here there was less natural freedom from parental control

Security—the drive towards a safe, familiar, regular occupation and way of life; the tendency to live at home, take a familiar job requiring no initiative or launching out on one's own, to take a job with steady employment prospects.

This drive probably operates with great force among women in all social classes With the comparatively well-to-do it was less obvious since they were surer of material support As economic pressure increased, it showed more clearly, and was evidenced by the fear of taking an unfamiliar job or of going away from home to live. This timidity was frequently attributed to the parents' influence.

Ease, pleasure, or *amusement*[1]—the drive towards a state of wholly pleasant and congenial occupation, with avoidance of the arduous and unpleasurable; towards having a good time, with no hard work or intellectual effort, short hours, good working conditions,[2] plenty of amusements, flirtation, (in some cases) early marriage.

This drive was found more frequently among girls lower in the social scale, possibly because it is not discouraged in this type of home; it may be severely frowned on in upper middle-class homes (especially those of the professional classes), and is disapproved of in scholastic and academic circles. The charge is frequently made, particularly against working-class girls, that they leave school and take the first job that comes to hand because they "just want to get married" and anything will do till then. The implied accusation is that these girls are actuated simply by the drives towards pleasure and security. There are, however, no grounds for assuming that these are the only drives operating, though they may be very important, especially with girls of sixteen to twenty. In fact, the motivation behind the desire for marriage is highly involved.

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[1] The title of this drive is not a satisfactory one, although the drive, which was best characterized as "wanting to have a good time," undoubtedly existed. In any case, the "pleasure" drive should be distinguished from the affective tone of pleasure (or unpleasure) accompanying the satisfaction (or dissatisfaction) of any drive

[2] There are of course very numerous cases in whom this drive functions as a desire for adequate means of *recreation*, without in any way affecting working capacity, but these fall into a different category

There are no doubt instinctive biological drives operating here.[1] And equally there is no doubt that such drives are greatly facilitated by the social prestige accorded to marriage for women. But the extent of this prestige varies a good deal between different social classes, it is possibly less strong and certainly less overtly recognized in the professional classes and especially in scholastic and academic circles However, the desire for marriage is in many cases further reinforced by the drives towards security and pleasure, since marriage is frequently envisaged as providing a safer and more pleasurable type of life than any other. This tradition is also of course socially re-inforced (though cf 'Mr. Punch's advice to those about to get married!'). The drive towards independence also functions, since in working-class homes complete freedom from parental control usually comes only with marriage. Finally, the humanitarian protective drive is often involved.

The complementary aspect of the drive towards obtaining pleasure is the drive towards avoiding the difficult and unpleasurable. It may appear as the desire for an occupation in which the relief from these difficulties is phantasied This was found in all social classes, particularly among children at all emotionally unstable, or with difficult home backgrounds.

Superiority (ambition)—the drive towards excelling, standing out, being superior to one's fellows; succeeding in one's job, having a career and an occupation with good openings; going to the university and entering a profession because that is a sign of success.

This drive is naturally most likely to occur among girls of superior intelligence and initiative It was rarely referred to directly by those from whom this enquiry was made, and its existence could only be inferred indirectly

Power—the drive towards dominating, exercising power over one's fellows, sometimes overtly, sometimes as the "power behind the throne"; towards organizing and directing people, towards being "bossy" and "throwing one's weight about"; towards the assumption of responsibility.

This drive again is only prominent in a few individuals It was not often referred to But although there appeared to be little direct evidence for the existence of these drives, more will appear in a later part of this paper.

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[1] It is clear that no list of all the drives which actuate individuals would be complete without the sex drive In point of fact it was at first included in the list given in this paper, but it was so hard to obtain any evidence in the subsequent enquiry as to its nature and incidence that it was ultimately omitted.
See Part II of this article, February 1938.

Social admiration—the drive towards socially admired activity, towards an occupation in which one can exhibit one's particular charms for admiration.

This drive comes very close to that towards superiority but it does seem to emphasize to a greater degree some type of social reference, however superior one might be, it would give no satisfaction unless recognized and admired by others. This drive was seldom referred to directly, but its presence was inferred from the desire to enter certain occupations (hairdressing, beauty culture), a desire which often seemed inexplicable to those from whom this enquiry was made. In some cases the drive seemed to be persistent, in others quite ephemeral.

III.—THE MAIN ENQUIRY INTO THE DRIVES OF STUDENTS.

(1) *Method of Enquiry.*

For the purposes of this enquiry it was decided to select a group of individuals of a type with which the author was already familiar, who were moreover of superior intelligence and possessed superior powers of expression and verbal communication. The group consisted of forty-seven women university students, aged twenty to twenty-five years (with one or two exceptions), coming from secondary schools all over this country (with one from New Zealand). Thirty-four were in their third year, six in their second year, four were in their fourth and one in her fifth year; and two were post-graduate students from other universities They had all definitely contemplated, if not finally decided, their subsequent careers.

Each student was interviewed separately for a period lasting from half an hour to an hour The questions asked were drawn up beforehand in general but not in exact form They became fairly stereotyped during the course of the interviews, but were invariably modified in individual cases in the light of previously given replies and information. Any appearance of routine questioning was avoided as far as possible. At the same time, the experimenter endeavoured to follow certain definite rules in putting each question, which were as follows:

(1) Direct questions about topics likely to be embarrassing to the student were avoided, since they might set up hostile resistances; e.g., she was not asked, "Do you want to get married?" but "Are you very keen on having a career . . would you want to go on with it even if you got married?"

(2) If the student stated that she was very "keen" on a certain pursuit, she was not asked simply, "Why?" but "What is it about (so-and-so) that makes you keen on it?" The distinction between these forms

of question may appear slight, but in point of fact the latter does give the individual more assistance in observing and stating the nature of his interest.

(3) Forms of question suggesting definite positive answers and resisting negative answers were avoided; e.g., "Didn't you . . ?" "Wouldn't you . . . ?" Instead of a question such as, "Do you like A better than B?" was used the form, "Which do you like best, A or B?" Whenever definite interests or pursuits were mentioned or enquired about, alternatives were also mentioned.

The outline of the questions is as follows:

(1) Can you tell me about the things you most enjoyed doing when you were at school? . . . school subjects that you liked at various times?

Did you do any work on your own, or was it always in set lessons? (If the former) Which did you like best?

Did you play games? Which games did you like?

Did you have any activities such as clubs for debating, acting, and so on, at school? Did you enjoy doing any of these?

Did you have anything in the way of prefect duties to do? Did they take up much of your time?

How did you like the staff? Were you friendly with any of them?[1]

What was the head mistress like?

How did you like the other girls? Were they nice? Did you do things with them out of school . . in the holidays? What other sorts of things did you do in the holidays?

(2) How do you like being up here (at the university)?

What are the things you enjoy most about it?

How do you like your work? What parts of it do you enjoy most?

Do you belong to any societies, clubs, etc.? What is it about them (about some particular club) that you enjoy?

Do you play games?

(3) Which do you like best, term or vacation? What is it about term (or vacation) that makes you like it best? What sort of things do you do in vacation?

(4) Have you thought at all what sort of job you want to do when you go down? What is it about (so-and-so) that makes you want to do it?[2]

Have you at any time thought of any other job you would like to do?

Are you keen on having a career? Would you want to go on with it if you got married? Would you want to go on doing some sort of work after you got married?

(2) *Treatment of Statements.*

The answers were studied as soon as possible after the close of each interview, in order that they might be reviewed in the light of the immediate impressions of the student gained at the interview These immediate impressions were recorded, and *after* this had been done an attempt was made to deduce which of the previously described drives seemed to be functioning in determining the students' interests, wishes, and choice of a career, and what were the strengths of these drives But only a rough estimate was made at this time of the occurrence and strength of drives. General consideration and comparison of the answers and classification of drives was carried out later

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[1] Although the influence of 'crushes' is frequently important, direct questioning is better avoided as likely to be embarrassing.

[2] If as frequently happened, a student said that she didn't want to do some particular job, e.g., teaching, she was also asked, "What is it about (so-and-so) that makes you dislike the idea of doing it?"

It may be objected that the scheme of drives which had been drawn up previously was too closely followed both in framing the questions—so that they suggested certain definite replies—and in interpreting these replies It is true that certain of the questions, though by no means all, were framed in such a way that the manner of reply tended to demonstrate the existence and strength of certain drives in particular. It may be, therefore, that the functioning of these drives has been made to stand out too clearly, so that they appear to have more importance in the individual's character than is in fact the case. For that reason we ought not to lay too much stress upon the apparent relative importance of the drives either in the single individual or in the whole group. Moreover, there may be other drives the existence of which does not appear at all, because no questions were given or answers received which demonstrated their functioning. But it has been pointed out already that this whole study is of necessity to be regarded as indicative rather than definitive; and the analysis and classification of drives must be taken for what it is worth, and as far as it goes The main characteristics of the nature and effects of the drives are shown as far as possible from the actual statements made by the various students. These statements refer in general to what appeared to be the main or dominating drive or drives in that particular individual. No attempt was made to derive any fundamental analysis and classification of individual character from this scheme of drives. But it is suggested that some light is thrown upon the character by a consideration of the main drive or drives (whether these reinforce or conflict with each other)—and particularly upon the aspect of character reflected in the individual's main interests and choice of career. In fact, it is claimed that the statements quoted below do demonstrate the operation of some of those fundamental tendencies in behaviour, usually held to proceed from character, which will continue to function in some form or other throughout the individual's life, and will therefore have an important bearing upon his future career. Naturally the appearance and the form taken by any one drive will differ considerably between one individual and another.

(3) *Method of Functioning of Drives as shown by Statements*

An examination of the statements made by the students seemed to indicate that the latter fell into three main groups, according to the manner in which their social conformity drive appeared to function This drive seemed to occupy a status somewhat different from all others. That is to say, it appeared as a basic tendency in almost all the cases described, and in the majority of them was obviously very powerful But it did not always result in the same type of behaviour, and the following different classes may be distinguished

(*A*) Where conformity was very strong, and no other very strong drives existed, the behaviour and interests of the individual were such that they conformed readily to the type of behaviour and interest most prominent in and acceptable to the particular social group in which the individual was situated at the moment

(*B*) In a different class are those individuals who appeared to have a very strong tendency to conform, but through some limitation of character were able to adjust themselves only to one or more rather limited types of social group. This inability had set up a state of frustration or deficiency

(*C*) In the third class are grouped those in whom other drives were as strong as or stronger than social conformity If they were about the same strength as the social conformity drive, conflict might ensue unless they were of such a nature as to be fairly easily integrated with the latter. But if social conformity was weak, it was sometimes almost completely swamped by some other drive or drives. It was possible to discover a graded scale of cases from those in whom there was marked conflict between social conformity and some other drive to those in whom there was complete integration and reinforcement, and another graded scale from those in whom social conformity was as strong as any other drive to those in whom it was very much weaker than some other drive Clearly these two scales present different aspects of relatedness between drives. The cases have, however, been classed together since the scales are not easy to differentiate in practice, and since it is more convenient to sub-divide the cases according to their dominant drive.

(*a*) *Cases actuated principally by social conformity.*

For the sake of convenience Class A and Class B may be grouped together, since these classes are made up of those in whom the social conformity drive was much more prominent than any other drive.

CLASS A.—This class contains those who seem able to conform and accommodate themselves to various types of society. They thoroughly appreciated school life, and display much gregariousness and social activity at the university. They belong to numerous societies, particularly those most in vogue at the moment (at this time, "Peace" societies), attend meetings and discussions, have many acquaintances. Their opinions are mostly decided, if changeable, and they have little difficulty in choosing their future career Among these people we may distinguish the more active from the more passive type The former do a great deal to inculcate social conformity through suggestions of social approval and disapproval, and often "run" social activities, though not necessarily with any actual desire for power or attempt to dominate In them, the activity, as well as the social conformity, drive is strong.

Thus N1's "interests have changed" very much since she came up, she has "dabbled in all sorts of things," has belonged to learned, political, philanthropic, debating, religious, travel, and topographical societies (one of which she organizes); but says that it is "nice to be rank and file" after two or three years' prefect duties at school. However, she wishes to go into the Ministry of Labour, because that provides opportunity for social organizing, with security and a good salary

S5 has always been involved in a "great rush of things", at school she took part in games, dramatics, debating, political societies, L.N.U, Christian Union, and has continued these activities at college, combined with a great deal of social activity. She intends to do mission teaching for the C M S., but is arranging to go among people whom she already knows, in a place where she will meet plenty of people who will help her to keep in touch with outside intellectual activities

These are examples of the more active social type. The passive type are remarkable chiefly for extreme conformity and gregariousness.

L2 used to like doing mathematics because she "knows what she is after" and "where she is going", "prefers working with other people" and being helped by them to working alone; now wants to stop this work because she doesn't understand it; tries to do it but can't get much further She enjoys the social life at College, but also enjoys the outdoor life at home. and when there doesn't want to come back. She thought at one time of doing house-property management, but gave up the idea because people talked about it in a derogatory way; she then heard a speaker from a teaching agency talk about teaching and this made her feel she would like to teach—a "safe, recognized job," more settled and fixed to begin with than social work

H1 "took up languages because her people were interested in them", disliked it when the disciplinary rules at school were abolished, has "changed a lot" since she came up, works less hard and spends more time on other interests—political, social, and religious—but is a games captain and a Guide; finds it "hard to get used to the difference in values" existing at the university and in her home life (i.e, to conform to different scales of values), wanted to teach when young, but decided to think it over because "nobody seems to like teaching nowadays"; then decided in the end she really wanted to because she "likes dealing with children."

S1 took up mathematics because "there was a strong maths tradition in the family, but doesn't like advanced maths, because it is too abstract—"no use for anything"; thought of teaching, but now thinks it would be more interesting to do something else because she "likes being with people her own age rather than with children."

T2 came up to the university because "it seemed the natural thing to do"; she finds it difficult to work alone; but likes the social activities and belongs to numerous societies; thinks she will like teaching because "people she knows like it."

These various students show varying types of social conformity from the more active to the more passive type who is content to be just "in the swim." In their favourite activities they illustrate the very strong social tendency which exists among women students towards "social service" and interest in social and political questions. How far such an interest is a genuine quality of the individual, and how far it is inculcated through social custom and tradition is difficult to demonstrate from these reported remarks. But a general view of the individual as a whole, such as may be gained (though superficially, it is admitted) in an interview, inclines one to suppose that conformity played the strongest part with the students just described

Class B.—Into the second-class fall those individuals whom the social conformity drive does not enable to change easily, as the social environment changes from one type of behaviour and interest to another. On the contrary, it seems to have stereotyped their desires and activities in one particular form, so that they try to preserve some familiar pattern of life, and are unable to adapt themselves to a fresh one Yet because they are still subject to the social conformity drive, they feel uneasy in a social environment into which they cannot satisfactorily fit themselves, and often long for or struggle to return to the familiar and more satisfactory state. Into this group fall the "Peter Pans" who refuse to grow up (for examples of this type, see also Austin, *loc. cit.*).

B2 has always "liked outdoor things best"; liked specializing in geography at school because she found the lessons easiest, said it "was rather an accident that she came up" to the university at all, likes it on the whole at the university, but is not keen on her work and gets tired of term; "doesn't really know what her line is," and had no ideas about jobs when she was younger; is thinking of taking secretarial training because she can think of nothing else, though she would really prefer an outdoor life.

T1 took up Latin because she was best at it, and liked the classics teacher; she had to work very hard to get to the university, and "had rather too much of it" her last year at school; likes it on the whole at the university, but doesn't know many people, and prefers the vacation on the whole because it is "less strenuous"; has "no great desire to do anything in particular"; didn't want to teach, but thinks she will try it because it is "a much better career than secretarial work" (the only other possibility). Her favourite hobby is bird-watching.

S4 was keen on hockey at school largely because her mother was good at it; she was no good at being a prefect because she was "very irresponsible and young for her age" and was "thought to be a silly ass", had "frequent rows" with the staff and head mistress, who thought, apparently with some justification, that she was responsible for all the trouble in the sixth form She has "quietened down" since she came up; there is "no opportunity for doing that kind of thing" at college But she "doesn't feel she has done all she might" at the university, is "getting in a mess about her work" She had always intended to do research work because she wouldn't be able to face the responsibility of teaching, her head mistress had said she "would never be fit for anything else" but research work. But now she "feels she can't bear to do more" pure science; and is thinking of trying for the Civil Service,[1] feeling she "would take more interest in other things" (present-day affairs) if she had to. If she doesn't get into the Civil Service, she will teach; she was always "scared of dealing with children, never could at school," but is not so much against it now.

M2 didn't like playing games at school, but played them because she "thought she ought to"; until she was sixteen, didn't get on with girls her own age but preferred older people, was much attached to one of the science mistresses, which may have influenced her to take up science, was very lonely when she first came up to college, "the people seemed so unfriendly". is still happier at home, because she feels she belongs there and knows people who are interested in the same things, whereas "the people here are more superficial and like "doing" rather than thinking" (a fairer criticism than it may sound, if it is referred to undergraduate society!) This situation has been brought about largely by the fact that M2's mother has been very dependent on her, and has no interests except her children

P2, who is considerably older than most of the students, has put off longer and longer the evil moment of beginning an independent adult career, she really desires the support and assistance of other people and of a conventional married life. She came to the university (after being at another university) because it was the "done thing" and all her friends wanted to; she now likes it because of the social life, but hates her work She is "drifting into teaching" because "there is nothing else to do"; she might turn over to social work if anything she liked turned up, but will probably stick to teaching because it is "more definite", yet "teachers so easily become old maids," and she has always wanted to have a home and family.

P2 presents a case which is somewhat different from the previous ones in this group In fact, she seems to be midway between this group and the passive type described in Class A. She would probably have drifted quite happily from one social group to another, had she not encountered an academic society to which she was intellectually and culturally quite unsuited. Thus her real need was to return to some less intellectualized type of society.

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[1] In general, when students intended to "try for the Civil Service" they wished to enter the Treasury Class, Administrative Grade, but were prepared to try for the Departmental Class (Inland Revenue, Ministry of Health, Ministry of Labour) if unable to get into the Administrative.

A1 presents a diagonally opposed case; she is well adapted to such a type of society, but has rejected all others. She finds her family hard to get on with; was at a boarding school where she hated the lack of privacy, liked none of the staff and few of the girls because they were dull or hadn't the same interests. She became more sociable while at college and now sees quite a lot of people; wants to stay up for a fourth year and possibly do research work; she is quite keen on her subject, but doesn't want to work very hard at it, or have a career; but she doesn't know what else to do, and doesn't want a job which "involves much forced contact with other people"; she "hates institution life." She can't decide if she wants just to marry and give up all her work, or to keep it on as a permanent interest after marriage.

These students differ in detail from one another, but are alike in that they are all dissatisfied, not because they possess some strong urge or drive which it is impossible for them to satisfy, but because they don't really know what they do want. They have mostly hitherto taken things as they came (except A1); they might be quite ready to continue in this way, but they cannot strike out for themselves. They might be content to be dependent on others, but are unable to face an adult life of struggle and independence. It is not possible to judge from these statements what exactly has differentiated the behaviour of these students from those of Class A. It is possible that they possess some innate temperamental weakness. But one might hazard a guess that most of them have encountered some difficulty, probably of parental origin, in their upbringing which has made normal social adaptation difficult or impossible for them.

(This article will be concluded in the next issue, when French and German résumés will appear.)

CREATIVE EDUCATION AND THE FUTURE.

By OLIVE A WHEELER (University of London Press, 1936, pp xi+365. 8s 6d.)

In this book Dr Wheeler has given a masterly exposition of modern trends in educational theory and practice. In calling it "Creative Education" she uses the word "creative" in the Bergsonian sense Whatever else it implies it at least implies change. change in the social and physical environment, change in the human beings who dwell in that environment. She accordingly has no sympathy with a merely retrospective attitude of mind such as finds expression in Dr. Cyril Norwood's book, *The English Tradition in Education*. Dr. Wheeler's book, while giving due weight to the past, owes its freshness and attractiveness to the fact that the author shrewdly analyses the present condition of society and indicates the lines on which the education of the future will probably run. She looks forwards rather than backwards, and her criticism of static education is well grounded Dr. Delisle Burns has pointed to China as an example of the outcome of a system of education which has stood still while the social organism has moved forward.

The general scheme of the book falls into three parts. The first deals with "the living present, to which individuals now being educated must adjust themselves if they are to play their full part in the emergence of higher values." The second part describes the nature and phases of human development. The last part brings together the data set out in the other two parts and deduces from them certain conclusions respecting modern tendencies in education, and attempts to solve some of the outstanding problems.

In analysing present conditions the author quotes Professor Whitehead as saying, "The greatest invention of the nineteenth century was the invention of the method of invention. . That is the real novelty which has broken up the foundations of the old civilization" That is well said. I cannot, however, agree so readily with another of the author's quotations from Professor Whitehead "The present contains all there is. It is holy ground, for it is the past and it is the future" It may well be contended that there is no present The present is nothing but a cross section of human life which divides events into past and future, both of which are equally real, and all of which are really co-existent Such, at any rate, is the conception given us by Mr Dunne in *An Experiment with Time*.

The author's exposition of modern life leans towards optimism She does not, as some rashly do, trace all our industrial troubles to the extended use of machinery and of modern inventions If that be the root of the evil the remedy is to be found in one other alleged invention · a machine which requires a hundred men to work and which does the work of only one man As Dr. Wheeler wisely says, " It seems not improbable that the industrial revolution was only half a revolution, dependent on the growth of the physical sciences. The other half is perhaps still to come through the development of the biological and psychological sciences "

In the second section, where the author deals with questions of growth, she speaks with special knowledge and authority—particularly in treating of youth. One of her remarks is deeply significant " From an analysis of the responses to absurdity and other forms of reasoning tests, it seems probable that it is only in adolescence that our interest in rational as distinct from empirical explanation develops. It is not so much an enhanced capacity to reason that is indicated, as a new interest in reasoning " This seems to me to be a vitally important distinction. It explains a paradox It seems at first sight profoundly puzzling that in early adolescence, when the growth of intelligence as conceived by the psychologist begins to slow down, as conceived by the ordinary observer it begins to speed up. Indeed all writers on adolescence previous to the advent of intelligence tests (Stanley Hall is the outstanding example) take it for granted that there comes at puberty a sudden access of intellectual activity, and presumably a rapid development of intelligence. What really happens is not an expansion of intelligence, but an expansion of interests. It is not the amount of intelligence that increases, but its use under the motivation of interest. I mean by *intelligence* of course Spearman's *g*.

The relation between intelligence and educability is often wrongly conceived. Intelligence grows, and its growth may be impeded or fostered by circumstances and by schooling, but in itself it is not, in the strictest sense, educable. It is a tool of education, not its product. When the tool is at its best education can make the most rapid progress For the human machine is then driven " on top gear." Educability depends on two factors . the fixation of habits and the acquisition of ideas ; in other words, partly on the plasticity of the nervous system, partly on the receptivity of the mind. And interest comes in as a driving force.

William James, in his celebrated chapter on Habit, asserts that we drift into old fogeydom in the twenties and that " by the age of thirty the character has set like plaster and will never soften again." Dr. Wheeler contests this view and points to the striking success of adult education as indicating that educability lasts much longer than this hypothesis of old fogeydom would suggest. Personally I agree with her Neither intellectually nor morally is the hardening process inevitable It is one of the aims of education to check it. There is, somewhere in America, a highly successful nursery school for the aged It admits no pupil under seventy. *Floreat Senectus* !

In the last of the three sections of the book the author brings her learning and her experience to bear upon the many practical problems of the classroom in a way that cannot fail to benefit the teacher and the administrator It is, so far as it goes, full of wise comments and suggestions. I say, "so far as it goes," because it does not go as far as one could wish. This is not a criticism but a compliment. So well does Dr Wheeler deal with the adolescent that one feels dissatisfied with the sketchy way which the breadth of her treatment and the limited space at her disposal compel her to treat schools for the adolescent. I refer particularly to the new senior school An experienced inspector recently assured me that the most pressing problem (and the most difficult) in education to-day is the senior school It has proved to be both a revelation and a disappointment It has failed to fulfil the promise of the Hadow Report, but it has shown up the contingent of dull and backward children that popular education has to cope with It always had to cope with them, but there was a lurking belief that their presence in the school was due to bad luck or to bad teaching. Now everybody knows that though some of them are backward by accident, most of them are dull by nature. I heard Professor John Adams thirty years ago read a paper on the dull child He said that in his early days as a teacher, the time of annual examinations, the first thing a teacher did to a dull boy was to try to induce him to go to another school. If that failed he would buckle to and teach him But he had no choice of subject matter. The examination settled that. In the new senior school the head teacher has a choice of subject matter, and a choice of methods; and he needs expert guidance. But Dr. Wheeler would need a whole book to deal adequately with the problems that bristle in the new senior school

In dealing with the reorganization under the Hadow scheme the author points out that the breaks in the pupil's school career have no corresponding breaks in his mental development. His curve of development is smooth and continuous Nor is every pupil at the crucial age of eleven plus at the same stage of mental growth or of scholastic attainment The breaks are in fact matters of administrative convenience, not of educational necessity. And the classification of pupils by age, which is often imposed on the reorganized schools by certain people in authority, is as bad a mode of grouping as could be devised It would be just as wise to classify by weight

The last chapter, which deals with newer methods of discipline and teaching, affords an excellent example of the way in which the author's enthusiasm for freedom—manifest throughout the book—is seasoned with common sense Though she is dead against the discipline of repression and does not believe in fear as a legitimate motive for good conduct, she does not believe in any one mode of discipline as applicable to all cases There is the same need for discipline to be individual as for instruction to be individual Sound as Homer Lane's methods at the Little Commonwealth were as a whole they sometimes failed. Referring to this venture Dr. Wheeler says, "The partial success and partial failure of the experiment showed that while freedom with social responsibility certainly has power to regenerate certain individuals, there are others who seem to need remedial treatment before they can be prepared for freedom " In fact each case should be diagnosed before the proper mode of treatment is decided on.

The author comments on the absence of any real guidance in regard to the sex-impulse as it emerges in adolescence, and she strongly disapproves of the old policy of hush-hush. As she wisely remarks, "Discipline of the sex-impulse, as of other instincts, should be positive and sympathetic, and not negative and repressive "

To the three ancient ideals, Truth, Goodness, and Beauty, Dr Wheeler has added a fourth, Peace

In one or two minor matters the author is I think at fault. She defines *genetic psychology* as the branch which deals "with the development of experience and behaviour with increasing age." This is but half the province of genetic psychology The other half treats of the evolution of mind in the brute creation and in the human race Reference is made on page 47 to "the establishment of compulsory elementary education in 1870." This is not strictly correct. It is true that the Forster Act of 1870 rendered universal education possible, but it was the Sandon Act of 1876 that rendered it compulsory.

These, however, are mere trifles The book as a whole is singularly free from errors Its value is enhanced by the author's lucid style and her extraordinary skill in exposition. For training college students the book is admirable For acting teachers it provides reading which is in more senses than one, refreshing For everybody who is interested in the betterment of mankind it gives an eminently readable account of the present position of education in the British Isles, and of the philosophic and scientific principles on which it is based. P B BALLARD.

BOOK REVIEWS.

On the Bringing up of Children: Edited by JOHN RICKMAN. Papers by five psycho-analysts (Kegan Paul, Trench, Trubner and Co, London, 1936, pp 237 6s. net.)

The purport of this volume is a study in six lectures of various aspects of infant life from the psycho-analytic standpoint, i e, upon weaning, habit, the nursery as a community, the uses of sensuality and upon planning for stability.

In any domain of human knowledge which lays claim to be called " scientific " a rigid discipline of thought is essential It is so much easier to base arguments upon inferences instead of facts This is especially true of the investigations into infant behaviour, because the infant cannot actively co-operate Professor Thomas Huxley once said that the greatest tragedy he knew was that of a beautiful theory killed by a nasty little fact The pitfalls in the psycho-analytic study of infancy are those of building up an imposing but inverted pyramid of theory resting upon the smallest modicum of observed fact. The human infant is after all merely an exceptionally immature member of the Mammalia and shares with the rest of the young of that Order certain fundamental processes of evolution and growth from the ovum to the adult It cannot be considered as an organism apart, unique and unrelated to the rest of the animal world, nor without taking into account its developmental history The gradual myelination of the cellular structure of the nervous system, the growth of the cerebral cortex and of the association paths connected therewith, or the increasing integration of inherited nervous patterns, all play their part in the reactions of the growing infant to the world outside itself

These pitfalls and the neglect of observed facts such as the above, give to the volume before us the appearance of fantastic unreality For example,' on page 32, it is stated that " Babies of a few months of age certainly indulge in fantasy-building " and that " the object of all these fantasies is, to begin with, the breast of the mother, which becomes imbued with the characteristics of good and evil." Further, " this can be explained by the *fact** that when the child turns his hatred against the denying or ' bad ' breast he attributes to the breast itself all his own active hatred against it " We may legitimately ask where are the facts on which this inference is based What of the hosts of infants who have never known the maternal breast but are bottle-fed ? Does the rubber nipple become to them the prototype of good and beneficence or of evil and persecution ? or does the statement that " in fantasy the child sucks the breast into himself, chews it up and swallows it and feels that he has actually got it there " apply equally to his feeding bottle ?

All we really know is that at birth and for some months afterwards myelination of the nerve fibres is incomplete and the association paths undeveloped, yet until these processes are complete adequate functioning in terms of the formation of ideas, wishes, motives and the like is impossible Those mental functions which we describe as " thought " are the essential precursors of fantasy-building, and hence cannot exist in this early stage of life. Yet it is presumably in the first six months of life, at the end of which weaning usually takes place, that " fantasies and feelings of an aggressive and of a gratifying erotic nature play a dominant part first of all focussed on the breast of its mother, but gradually they extend to the whole body Greedy erotic and destructive fantasies and feelings have for their object the inside of the mother's body Analytic experience has *proved** that these tendencies go along with fantasies of a definitely cannibalistic nature " Again we ask where are the facts to support this " proof " of cannibalistic sadism ? It is difficult to believe that a child of six months can recognise an " inside " as well as an " outside " of its mother or that a child of such a tender age is capable of building upon his bodily secretions a wealth of urinary or stercoraceous fantasies in relation to his parents, such as is described in this book. Yet these are stated as *facts*. In reference to urination the author writes ; " This is another means of expressing rage and fury with his mother when he cannot get what he wants—it is another instrument of aggressive attack upon her In his unconscious fantasy he wishes to wet and drown and burn his mother with his urine, although at other times he may feel it to be a good gift towards her, given in return for her milk." Now the implication in this statement can only be that the suckling child has sufficient intuition, reasoning capacity and knowledge of the physiological processes of lungs and heart to understand the malign results of water or fire upon the human organism, in drowning or burning. Statements of this kind abound throughout the book—some even more bizarre and chimerical.

In many aspects this so-called psychoanalytical approach may be compared to that which may often be found at a spiritualistic seance. Here the sitters listen to the ramblings of the medium with a tense expectation of a message for themselves. Some saying emerges in due course which is immediately accepted as a genuine communication from some super-normal agent. It is the same attitude of mind which builds a theory of infantile fantasies upon evidence which is equally crude and unsupported. There are still people who hold a firm belief that the earth is flat and adduce arguments to rebut all evidence that it is not flat but spherical Their own arguments are to them sufficing and irrefragible This is equally true of those who hold that from birth onwards the human infant is endowed with a memory of its passage from the womb, has knowledge not gained by experience, and is capable of building up its conscious relationship to the social world around it upon the study of its faeces and urine. *Nimium ne crede*

G A.

[*] The italics are ours.

Psychology of Adolescence. By LUELLA COLE. (Allen and Unwin, Ltd., pp 497+xvi. 12s 6d)

This book is essentially practical in its intention, scope and method It presents " a relatively comprehensive picture of the adolescent years," at least as they occur under American conditions, based on objectively discovered facts, and applies the facts brought under review to the solution of some of the practical problems of the care and upbringing of adolescents.

There are three main sections in the book in addition to the Introduction and Conclusion. The first deals with " Normal Adolescence " and presents a balanced account of the physical, emotional, social, moral and intellectual developments characteristic of the period. The chapter on moral and religious development is especially provocative and stimulating. The results of recent American investigations in regard to the development of honesty in childhood and adolescence, and in regard to the adolescent's attitude to prohibition, communism, racial prejudice and religious questions are collected together. There is no critical assessment of the methods employed by the investigators or of the value of the data collected, but the chapter is both interesting and suggestive

The next section of the book deals with " Types of Adolescents " , including the normal adolescent, the delinquent, the emotional deviate, the intellectual deviate and the vocational misfit; and includes some interesting, though superficial, illustrative case studies. One of the most valuable features of this part, and indeed of the whole volume, is the wealth of illustrations, calculated to enable even the man-in-the-street to follow the main argument

There is also a section on " The Adolescent's Environment," covering not only his home and school, but the community at large. Dr Cole's insistence on the need for modifications in the American High School curriculum to suit the greater variety of adolescents now proceeding to secondary education lends indirect support to the Hadow solution of the corresponding British problem A comparison of the American and British trends of development on this question would undoubtedly prove interesting and valuable.

Dr Cole's pragmatic outlook obviously brings with it certain limitations For example, there is a tendency noticeable throughout the book to accept the results of so-called objective tests, without critical examination of the selection of the questions and tests used, or of the methods employed in administering them Then there is no guiding definition of adolescence or of its sub-periods · and therefore data obtained from investigations on University students are not separated from, but are considered with, evidence relating to school boys and girls. There is no adequate underlying philosophy in regard to the nature of human personality and therefore, for example, emotion is regarded as something to be eliminated from the individual's experience (p 73) Notwithstanding these limitations, Dr Cole is to be warmly congratulated on having achieved her main intention—to write a practically useful book on Adolescence, or more strictly on Adolescence as it occurs under modern American conditions

O W

A Review of Educational Thought. (University of London Institute of Education, and Evans Brothers, pp. 159. 2s. net.)

This review consists of an exposition of *The Conflict of Philosophies* by Professor Clarke, *The Development of Educational Thought in the United Kingdom* (1920-35) by Professor Cavenagh, *Educational Psychology in the United Kingdom* by Professor Valentine, *American Philosophy of Education* by Dr I L. Kandel, and *French Educational Philosophy* by Gerard Milhaud It is a reproduction of a section of the Year Book of Education for 1937.

Professor Clarke's chapter clearly states the essential elements in present day conflicting philosophies, and wisely leaves them as conflicts to the harmonization of which free England may yet make an important contribution Plato and Rousseau serve as the central figures of the discussion, and both are held to diagnose a state of moral weakness and evil in men as men which is shown to have interesting parallels with the present. The basal assumption seems to be Professor Hocking's idea that "education must provide the type and it must provide for growth beyond the type"—a conception which, perhaps, is not free from that "fatal dualism" which Professor Clarke thinks to be "at the root of much of our trouble to-day." The temporal sequence which it suggests to Professor Clarke (p 8 "if education does not produce the type first, it can produce little else but 'airy wisps to be blown along a wandering wind'") does not too readily harmonize with the unity of a free personality, or with the idea that some abiding sense of the reality of original sin may yet prove to be the greatest need of democracy.

Professor Cavenagh surveys with his usual breadth, tolerance, and incisiveness the main developments of educational thought (including its main practical, as well as its main theoretical manifestations) during the post-war period. Some of his short sections, for instance, the doctrine of interest, are triumphs of compressed critical reviewing, and many of them will leave the reader clamouring for more.

In a longer chapter Professor Valentine gives an admirable account of educational psychology in the United Kingdom. Nothing of real importance seems to be omitted, full references for further reading are given, and the sections show that combination of lucid brevity, caution, and criticism characteristic of Professor Valentine's work. No such simple or attractive introduction to educational psychology has hitherto been presented within the limits of fifty pages.

Dr I L. Kandel's masterly exposition of American Philosophy includes a comprehensive statement, and a searching criticism, of pragmatism which will be found suggestive to those who agree with him that "the pragmatic philosophy of education is still a hypothesis waiting for verification."

M Milhaud's sketch of French Educational Philosophy takes a historical form, and concentrates mainly on the theoretical and practical implications of the individuality of the child The *Review* gives a marvellous variety of information and criticism, and it will be read with interest and profit by students of education of all stages of development.

W. J. McC.

Psychological Studies of Human Variability by Various Writers Edited by W. R MILES. Psychological Monograph, Dodge Commemorative Number (Psychological Review Publications, No. 212, 1936, pp. 415. $4.50)

This volume, contributed to by many well-known names in the psychological field, has been compiled in commemoration of the completion of forty years of distinguished service to psychology of Professor Raymond Dodge. It has been dedicated to him by his students, research workers and collaborators.

The preface, written by different writers, contains, as is appropriate, an appreciation of the man in whose honour the volume has been produced, and also other articles dealing with the contribution he has made to the Institute of Human Relations, a bibliography of his works, and character sketches of him written by former students It also contains a reproduction of Dodge's first successful eye-movement photograph, which was probably the earliest successful record of eye movements ever photographed on a moving plate

The remainder of the volume, which comprises 407 pages, contains valuable original material, to which it is impossible to do justice in a short review. It is divided into four sections which may be enumerated to indicate its scope Experimental studies on children, Experimental studies on adults, Experimental studies on visual functions, and Historical and theoretical studies Each section contains a number of articles in each of which different aspects of the problems are discussed In the first section, for instance, we find such authorities as Dearborn, Freeman, Gesell, Halverson, Thompson, and Washburn, names sufficient to indicate the high standard of the volume The subjects they discuss are varied both in matter and in treatment . The use of the tachistoscope in diagnostic and remedial reading, Intellectual growth of children as indicated by repeated tests, Some observations of developmental stability, Complications of the early grasping reactions, Sleep requirements during infancy, A simultaneous observation and recording method with specimen records of activity patterns in young children

The whole volume will well repay careful study. It is indeed a fitting tribute to the genius of one who has contributed so much to the furtherance of psychology.

M C

Psychology and the Promethean Will. By WM. H. SHELDON (Harper Bros. $2 50)

The theory of this book is that there is one central human conflict that centres round a very fundamental divergence between a true-conditioned or character-phyllic trend and a waster or character-phobic trend in human personality. The mind is a unity, but as doctors of medicine for the purposes of study separate in thought the unity of the human body into a series of different systems, so our author views the mind as a series of five "panels" named as follows (1) Panel of Maternal Relations , (2) Panel of Social Dominance and Submission , (3) Panel of Sexual Relations (4) Panel of Orientation , (5) Panel of Feeling-awareness

Institutionally, they are the economic, political, sexual, religious and æsthetic panels

It is in the study of the fourth and fifth panels that Dr Sheldon breaks new ground It is here that the conflict is sharpest between the Epimetheans, who want safety, the preservation of inherited dogmas, and the Prometheans, who seek adventure and who live by the endeavour to discover new truth, however dangerous to "faith" that endeavour may be "The Promethean conflict is the strife which takes place in the human mind between the yearning for understanding, and the nearer more immediate pull of those living affections and desires which are conditioned upon the goodwill and the support of fellow beings " This conflict is the rock upon which the religious mind founders and is split against itself

Like so many philosophers Dr Sheldon seems to think the world is populated by people who have had at least a graduate education, roundly asserts that under no circumstances should a human child ever be born in a city or allowed to spend any of the growing years within reach of the urban influence, and does not deal with the real problems of teachers face to face with the masses born in cities Nevertheless he has written a suggestive and provocative book

H P

Psychology and Religion in Early Childhood. By J W D. SMITH, (Student Christian Movement Press, pp 91. 2s 6d)

The author is convinced that "the religious attitude to life brings us very close to the teaching of modern psychology"· according to each "the way of courage, faith and self-giving is the way of life, and the way of fear and selfish desire is the way of spiritual death " He points out that much of the moral and formal religious education children receive in early years encourages fear and is inimical to a faith and trust in the nature of reality, which is that in religion which differentiates it from psychology

The author holds that formal teaching of Christianity should not begin before adolescence, because not till then is a child ready to grasp the principle of self-giving love, which Christianity offers for the guidance of human conduct and for the interpretation of reality, not until then is he aware of the problem of death, or interested in human destiny

So far the author makes his point, but may it not be asked whether he is not to some extent overlooking the facts that behaviour and philosophical beliefs are less central to religion than is worship, and that worship springs from wonder and admiration, the prerogatives of early childhood? If this is so, there is a greater place for religious education in early childhood than is covered by "example and precept," necessary as these are

Because early religious education and moral teaching are often foolishly given, and therefore subversive to subsequent spiritual development, it does not necessarily follow that the remedy is to cut them out, the author admits that religious ideas can be given to the young child, but recommends that at this stage it is best not to link them with conduct M H

Studies in Psychology of Reading, Vol I Edited by JOSEPH TIFFIN University of Iowa Studies in Psychology, No XXI (Psychological Review Company, Princetown, N J., pp vii+149)

This monograph gives an account of five distinct researches in the psychology of reading carried out in the Reading Clinic of the University of Iowa In four of the researches eye-movements constitute a common factor The aim of the experiments has been to determine the relationship between the various characteristics of eye-movements and the quality of the reading, the quality being measured by certain standard reading tests The results confirm what other investigators have discovered, and indeed what common sense would lead one to expect Good readers, for instance, are found to read faster than bad readers, to take longer sweeps with the eye, and to have the fixation-points fewer and further apart A more minute analysis is, however, attempted, and the various factors more precisely measured An attempt, too, is made to discover the elements common to silent and oral reading, and to discover the extent to which one can be regarded as a measure of the other

The most novel, and consequently the most interesting part of the book, deals with the relation between the movements of the eye and the utterance of the words in oral reading It is a well-known fact that in reading aloud the eye always runs ahead of the voice The exact degree to which the eye leads can only be guessed at unless one uses a piece of apparatus such as was employed at the Iowa Clinic and is described in this book It records simultaneously the movements made by the eye and the sounds made by the voice, and thus enables the experimenter to examine at his leisure the relationship between these two factors The relationship is shown to vary considerably with the general quality of the reading as estimated by recognized criteria As might have been guessed, the better the reading the greater the lead Many other conclusions, however, of a more recondite nature are drawn from the results obtains by experimenting with this valuable piece of apparatus

P B B

A Headmaster Reflects By GUY KENDALL (William Hodge and Co., Ltd, pp. 288 7s 6d.)

Those who took the advice of the reviewer and read Mr Kendall's former delightful book, "A Headmaster Remembers," will welcome another volume from his pen Some half of these twenty-seven short chapters have appeared substantially before in articles in various newspapers and journals, and necessarily in a book of this kind there is not the same continuity and thoroughness in treatment that one expects in a more continuous work However, it is good to have the comments and reflections of a headmaster of such breadth of view and varied experience on so many different topics I venture on one criticism In discussing the training of teachers. Mr. Guy Kendall surely exaggerates the difference among psychologists, that is unless he necessarily includes among psychologists the psycho-analyst and some medical psychologists Furthermore there is a suggestion that students should find a new philosophy, excellent as it is, does not ensure altogether a critical and a balanced attitude in psychological matters Here Mr Kendall seems to fall somewhat into the error which he himself protests against among those who contend for the "general training" given by classics or any other single subject Here and elsewhere, indeed, Mr Kendall himself psychologises freely in a way that has a direct bearing on important educational problems, and these should surely be included with a much more thorough background and evidence in the studies of students in training The danger of exaggerated and extreme unjustifiable application is surely best met by a very critical approach for such students I would not, however, leave the impression that Mr Kendall is unfriendly towards psychology. Indeed he is a strong advocate of the use of mental tests and even suggests that every school staff should include a skilled psychologist to assist the headmaster

Visual Perception By M. D VERNON. (Cambridge Univ Press, pp 247 15s)

For some time past the student of psychology has been in need of works of the kind that Miss Vernon has put before us. An enormous amount of experimental work has been done in many departments, the records have been accumulated over many years and by this time they sadly need to be sorted out, not only to facilitate the study of psychology as it stands, but also to assist the researcher This book will save him much time and enable him to find places where he can do really good work either in fresh fields or in confirming and checking what has already been done

Miss Vernon makes a survey which she is careful to leave free from prejudice in regard to theories The documents are carefully listed, so that the student, be he a beginner or an advanced psychologist, finds a summary and can easily run down the original texts, and if disposed he can form his own tastes in theory Naturally the work of the Gestalt psychologists is bound to receive attention in any modern book of importance, but the freedom of this work from bias is remarkable

The writer deals with the stages in the perceptual process, word perception, the effects of attitude and the structure of the objective field upon perception She devotes two chapters to configuration and one to individual differences of types There is a part devoted to the development of perception in children and an appendix describes various forms of tachistoscopes for experimental use A vast amount has been brought within the covers of this book and the going is a little heavy at times, but the student will find compensation by having his labour spared in other directions

Mind and Memory Training By E E. WOOD. (Pitman, pp. viii+188 5s)

Professor Wood has written this non-technical book on memory for popular reading and study He says it is the result of many years devoted to the study of memory systems in Europe and in India Some people are endowed with good memories due to the organization and cultivation of certain natural qualities which are possessed in common by the majority of their fellows The book examines the phenomena of being able to remember, it draws out a few rules and sets them forth so clearly that although it may not be possible to achieve the genius of the classic memorisers, the average person can at least improve his powers to a considerable degree

The author shows how concentration, association and imagery can be used to advantage. Mnemonics and other aids to memory are described and one particular system is dealt with in considerable detail These aids are often interesting, though it is doubtful if the reliance which the book rather seems to suggest can be put upon mnemonics is really justified but they afford subject for study of association and imagery if one reads between the lines

This is a useful addition to the psychological works already published by Sir Isaac Pitman and Sons

Measurement in Psychology. By THELMA HUNT. (New York Prentice-Hall, Inc, 1936, pp. xx+471 $3.)

This book is in seven parts devoted to tests made in various fields of work, as, e g, achievement in schools, industrial fatigue, vocational selection, personality, and so on, not forgetting a section on matters endocrinological

The first point striking the readers is that the book will be useful to those who cannot easily get at test material. Those of us who live in laboratories have it on file The general reader has not. With this book he will have no excuse for not knowing what a Pressey X-O test looks like, or the kind of thing covered by an Art-Judgment test.

The most obvious criticism is that the title is a little misleading. A description of test material is not quite the same thing as a discussion of the art of measuring with that material However, the author has certainly brought a lot of tests together, and has set them out so that he who runs may read. S.J.F P.

General and Social Psychology. By ROBERT H. THOULESS. (University Tutorial Press, pp. xii+522. 8s. 6d)

Dr Thouless has enlarged and revised a book published first about twelve years ago It was originally designed to meet the requirements of certain students of psychology, but the advances made in the study during these years have necessitated radical changes in this edition which will now be found of use by a much wider range of student Educational and social workers will find it of value as well as those who are making their first approach to psychology

A guarantee of the soundness of the views expressed by the author is provided by the names of those who in one way or another have assisted Dr. Thouless in the production of this book. Its value as a text for class use will be apparent to all those who glance through its pages, and one who has read it with some care can confidently recommend it

The Fight for Our National Intelligence. By R B. CATTELL (London, P. S. King and Son, Ltd., pp. 166+xx 8s. 6d)

The award of a Research Fellowship by the Eugenics Society and the granting of leave of absence by the Leicester Education Committee enabled Dr Cattell to make a survey of the intelligence of school children in Leicester and in South Devonshire The results of this investigation were first published in the *Eugenics Review*, under the title, "Is National Intelligence Declining?" In the book under review the results of the investigation are given together with the sociological and psychological implications arising from these results They are set forth in a style made pungent with many an apt metaphor and analogy The book will be judged as stimulating or irritating according to the reader's point of view in regard to the problem of the inheritance of ability. The author first presents the new evidence he has collected, interprets it as showing a tendency for the average national intelligence to decline, suggests causes for this phenomenon and then offers appropriate social remedies.

The book opens with three introductions by Lord Horder, Major Darwin, and F P Armitage, Director of Education for Leicester, which draw attention respectively to the medical, the eugenic and the educational aspects of the subject

In Chapter I, entitled "The Twilight of Civilization," the author suggests that ancient civilizations collapsed owing to the loss of good human stock, and that the same loss is to-day being incurred by the Western European races Chapter II, "Inquest on National Intelligence Levels," gives the results of the survey in urban Leicester and rural Devon and an interpretation of them in terms of the migration of intelligence to the towns, and the greater frequency of high grades of intelligence in small families Even though it may not invalidate the argument there is a serious omission in the collection of data, the public and private school population of the rural area has neither been sampled nor estimated. This vitiates the comparison between the urban and rural areas

Chapter III, " Intelligence Produced by Environment or Breeding ? " gives a useful summary of recent work relevant to the problem which Major Darwin in his introduction describes as " a controversy on which in my opinion much time has been wasted " There is, however, scant reference to the work of Hogben and G H Thomson and the name of neither appears in the short index There is no reference to the paper of Sutherland and Thomson (*B J P* , 1926) nor surprisingly enough to an article in the *Forum of Education* (1925) entitled, " Can Present Scholastic Standards be Maintained ?" wherein are similar data as well as arguments covering most of the ground of Chapters II and IV of this book.

In Chapter IV, " The Magnitude of the National Decline," Cattell the speculative eugenicist overshadows Cattell the cautious scientist, but this section of the book is none the less interesting or important on that account By means of simple calculations the author derives probable distributions of intelligence for the preceding and succeeding generations of the population

" The Present Deadlock in the War against Dullness " is the title of Chapter V and in it the deadlock is attributed to a complacency born of education, guarded by a Popular Press, nurtured by false hopes that a complex civilization will itself create intelligence or that environment can be trusted to select suitable hereditary constitutions, and these hopes in their turn are supported by a belief in a mistaken interpretation of the Christian ideal of charity Together these influences combine to blind the vision and sap the determination of the governments that should be tackling the problem of national degeneration

The concluding chapter, entitled " The Way Out," comprises about a third of the whole book It gives a survey of the social tendencies relevant to and arising from the differential birth-rate Among the topics dealt with are, dullness as a social burden, the family as an individual financial burden and social handicap, birth control, procreation as an ideal, the artificial culture of lethal ideas, such as the desire to rise socially, and the relation of eugenics to patriotism and religion " Galton at the birth of eugenics saw as clearly as anyone since that eugenics has to be regarded as a part of a religious outlook, and that view has been very ably championed to-day by Dean Inge " (p 138)

Though largely speculative in character and propagandist in style this book offers ideas that may well prove to be seed that will germinate in future investigations. It is most certainly a book that those interested in educational problems should study

E.J.G B

The Growing Child and its Problems : Edited by EMANUEL MILLER (Kegan Paul, Trench, Trubner and Co , Ltd., pp. 231 6s)

This is a collection of essays of very unequal value The one on educational guidance by Constance Simmons is a sound and useful introduction for parents to the study of the child from the point of view of intelligence and of special abilities. Its title, " Educational Guidance," is not perhaps the best, for it would be difficult in many cases to judge the type of school to which the child should go on the basis of the tests and studies dealt with here , so very much depends upon the elasticity of the school organization and the training and attitude of various teachers.

The chapter on " Neurosis in School-children," by Dr C. L C Burns, is probably the outstanding one in the whole book for its breadth of treatment, balance of judgment, and a willingness to attribute results to varying factors Dr Burns and Miss Simmons are almost alone in revealing a sense of evidence The chapter on " The Child's Needs and his Play," by Gwen Chester, gives many excellent suggestions for play, but the connection of these with the fundamental cravings and emotional need is not made convincing For example · " Water corresponds to some of the deepest and most primitive needs of the child." Yes, but surely it is also a unique kind of material to play with, and would quicksilver be enjoyed any less, if it were available ? Here and elsewhere in the book constantly one comes across the assumption that because with some abnormal children (with which most of these writers seem to have been largely occupied) a particular kind of behaviour is found in conjunction with some abnormality, therefore that same kind of behaviour in normal children is a sign of something subtle or neurotic or repressed. The result is that some of these chapters would be apt to cause considerable unnecessary worry and confusion in the minds of parents That of " Personality Deviations in Children," by Dr Clifford Allen, seems particularly unfortunate It might give the impression, for example, that every specially conscientious child will develop a neurosis simply because some neurotic children have been found at an earlier stage to be hyper-conscientious This is the kind of thing that I have in mind in suggesting that most of these writers seem to have so little sense of evidence At times one would also imagine that some of them have hardly ever come in contact with healthy young children

Typical of this point of view is a sentence by Dr Paterson Brown, who states (p 157), referring to children who like to play with fire or climb to dangerous positions in the trees in the garden, " In all these cases the child, while apparently without any sense of danger, is really pursued by a fear which it must deny or refute "

In the last chapter on the "Adolescent Youth," by the Editor, useful advice is given on the handling of adolescent boys, though even here the examples chiefly given are surely very extreme ones C W V

That Dreadful School. By A. S NEILL. (Herbert Jenkins, London, 1937, pp 224)

This is certainly not a dull book At times it is startling, to many people it will be shocking, to thoughtful people occasionally suggestive Its value, however, as a contribution to constructive thought on education is slight Mr. Neill is not as extreme in the practice of freedom in the school as some of his statements would lead us to expect, and his exposition does not profess to be systematic He is at times self-contradictory His statement that he set out to renounce all discipline, all direction, and all suggestion and all moral training, does not describe the work as actually carried out in his school No doubt he renounced many popular ideas upon morals and discipline, but he sometimes expels boys, and the children themselves in their own system of self-government give one another a most effective moral training

To refuse to stop a child "doing something dangerous" is, Mr Neill thinks, " being a fool about children " (p 170) He does not, moreover, allow little children to decide what food they shall eat, or when they shall go to bed, thus they are guarded against certain physical conditions and dangers He annunciates at this point what seems a sound principle " You should never give a child responsibility that he is not ready for ", to apply that in a wide way to matters of conduct might result in something very different from some of Mr. Neill's practical maxims

If it is difficult to glean any general principle from the book, it is equally difficult to get any solid basis of fact. Mr. Neill would no doubt scorn such a criticism and talk about dry statisticians, but he constantly adds to his claim of success with difficult children general statements which are inexact, or very sweeping For example, he says that one boy was " about the only case of trouser messing we have had in fifteen years I am sure that *every* case (my italics) is one of hate against the mother for starving of love " (p 77) How he reaches this conclusion in such a matter, when he has only had one case, it is difficult to understand. He is similarly obscure in the statement, "My experience is that every illegitimate child knows unconsciously that it is illegitimate " (p. 79).

The main positive idea put forward in the book is that children seek love and approval, and apparently Mr Neill is able to show affection to children who have been found somewhat unlovable One of the things on which he is most insistent is the removal of what he calls the masturbation *verbot* To worry about the evils of masturbation he attributes all sorts of consequences, and including some which would usually be called moral delinquency

At times the author reveals some belief in and attraction towards Freudian ideas. Here and there he makes use of one, though he thinks the psycho-analyst's treatment of children is of no value in itself, but only an occasion for showing deeper interest in the child, which eventually leads to a cure

Occasionally the book suggests something of an advertising prospectus, as, for example, when the statement is made about the good food always provided, but perhaps this is inevitable if the head master is to give an account of his school

Sex and Personality By LEWIS M. TERMAN and CATHERINE COX MILES. (McGraw-Hill Publishing Co , Ltd , London, pp xi+600. 25s)

This book is an important contribution to the study of personality. The authors describe a test, known as the M-F test, which purports to diagnose the masculine or feminine tendencies of a person's make-up, to express his departure from the norm of his sex by means of a test score.

Judgments of a person's standing in the scale of masculinity and femininity made by different intimate acquaintances show practically no correlation The M-F test therefore was based "not upon some theory as to how the sexes should differ, but upon experimental findings as to how they do differ, at least in the present historical period of our own country " (page 6) ; it is claimed that the test is therefore inherently and of necessity valid, and none can cavil at this.

The test is of multiple (or selective) response type, and contains 456 items, grouped in seven sub-tests, viz , word association, ink blot association, general information, emotional response, interests, opinions and introvertive response Of the several responses to each item at least one is typically masculine and is scored +1, and another typically feminine and scored −1 The test is self-administered and takes from 40 to 50 minutes to complete. Subjects are informed that it is simply an attitude-interest test

A mass of statistical data is supplied concerning the relation between test scores and variables such as physical measurements, personality traits, age, education, intelligence, occupation, interests, and homosexuality, and a closely reasoned discussion of each topic in all its aspects is given

Sex differences in temperament and interests are recognized as being largely the outcome of environment ; a child is under constant social pressure to behave as others of its own sex, to have the same interests and even the same temperament The M-F test therefore reflects mainly the environment of the subjects whose responses were used for its construction and standardization , the norms will thus not necessarily be valid for non-American peoples The extent to which innate qualities determine performance is as yet unknown.

The findings of the test are sometimes at variance with our preconceived notions For example, American policemen and firemen are amongst the lowest on the scale of masculinity along with priests, musicians and journalists, while at the top of the scale we find engineers, bankers and lawyers (Have the film magnates misled us?) The test may be found of assistance in vocational guidance, if further work shows a correlation between test score and occupational success

The relation of test scores to sexual inversion has been very fully investigated and many case histories are presented The test promises to be of considerable value in psychological clinics

The authors recognize that their work is of a preliminary nature, and that more research is necessary both to improve the test and explore its usefulnesses. However, one cannot but admire the thoroughness with which they have brought their enquiry to its present stage, and the scientific caution with which conclusions are drawn

The book will be welcomed by all psychologists and social workers

Child Care and Training : By M. L. FAEGRE and J. E ANDERSON. (University of Minnesota Press and Mr. Humphrey Milford, pp. 327. 11s. 6d.)

This book is a clearly written guide for those having the care of young children, and it should be particularly useful and interesting to the parents of the pre-school child The authors employ modern knowledge of physiology and psychology to indicate the best treatment of the child

The early chapters deal with the physical care of the child, and give much detailed information about average growth, wisely indicating the wide variations met There are valuable chapters on diet, clothing, sleeping, prevention and treatment of the diseases of childhood.

The following chapters deal with the child's mental development. The principles underlying his learning and habit formation are described so that the parent may understand how to help the formation of desirable habits Throughout these chapters the aim is set forth of giving the child the freedom necessary for his development, and to help him to become as independent as possible, and to exercise his own judgments

The questions at the end of each chapter are interesting tests of the adult's understanding of the principles expounded, and each chapter has also a list of relevant books and papers

Little was found to criticize or question In Chapter VII, dealing with the child's emotions, the authors definitely assert the American view that the child has no inherited fears, as of animals or the dark This would at least be questioned by the English psychologists, and its assumption may easily bring difficulties to a parent who might not recognize situations most likely to arouse fear in the child

In Chapter X dealing with bowel and bladder control, it was difficult to see why the late ages of six weeks and one year respectively were recommended for the starting of training If the principles set forth are observed of " holding out " the little one for a very short time when performance may reasonably be expected, encouraging success, and not condemning failure, why should training not begin after the first few days of a healthy infant's life ?

In Chapter XII dealing with Curiosity and Sex Education, it is advised that the child be accustomed to seeing his brothers, sisters, and parents unclad on the ordinary occasions of washing or swimming, up till the age of four or five years, after which he should acquire habits of modesty and privacy Many people would question this, and would expect harmful results from the years after five. Why should not the earlier freedom continue at any rate until puberty, when the child may more naturally be expected to acquire the habits of modesty and privacy ?

There are some charming photographs of children, and the book gave great pleasure at any rate to one parent

The Scientific Study of Educational Problems. By MONROE AND ENGELHART (Macmillan, pp. xv+504 12s 6d)

This is a difficult book to describe The successive sections run Educational Problems and their Definition , Collecting Data—Basic Techniques , Elementary Techniques for Handling Data ; The Faults of Data and their Effects , Studying the Past in Education , Constructing Measuring Instruments , Studying Current Conditions or Practices , Studying the Effect of a Specified Change in a Given Cause , Studying Problems of Prediction , Identifying and Studying Cause and Effect Relationships , Determining What Should Be , Evaluating and Synthesising Educational Research , Progress Towards a Science of Education , Appendices.

Some of these headings were not self-explanatory at first sight, and one had to turn up the chapters to see what the book was all about before beginning to read it through However, in the editor's preface, we are told that " the authors have endeavoured to cast the material in the form in which educators approach their own subject matter rather than to arrange it in some abstract order which might conceal scientific processes in educational thinking from all but the most highly trained technicians " One can see what this means (although it is rather a priceless statement), and with this key to its structure, the book can be understood If one is interested in, say, " Studying current conditions," one can find under that section a statement of the problem in general, an account of appropriate techniques (illustrated by copious footnotes), while at the end of the chapter is a bibliography, the said bibliography being the more valuable in that a short abstract is given below each title

Although the book is thus built around a series of education problems, or fields of work, there is nevertheless a system in the presentation of statistical material. The simpler problems of chance, etc., are discussed in the section on elementary techniques, errors are dealt with under faults of data, while the theory of correlation and factor analysis comes in the chapter on cause and effect relationships The system is complete

In general, one can but say that the work is encyclopædic, constituting a most valuable addition to the literature of the subject

S J.F P.

Objective Analysis of Musical Performance Edited by CARL E SEASHORE (University of Iowa Studies in the Psychology of Music, Volume IV pp. 379. Cloth bound, $2.50 , Paper bound, $2.00.)

The elaborate investigations described in this volume are an extension of the previous researches in the measurement and recording of the deviations from mechanical accuracy made in performance by recognized singers, violinists and pianists Such research is based on the premise that the composer's score is but a " schematic reference " about which the performer weaves his own interpretative modifications.

Two vocal studies are contributed respectively by Harold G Seashore and Ray S Miller , two in violin playing by Arnold M Small and Paul C Greene The analysis of violinists' deviations from the tempered scale is particularly valuable in that they are probably based on subjective tendencies common to musicians Dr Small's evidence as to the speed of vibrato differs from that previously submitted by Cheslock. Three studies on pianoforte playing are contributed respectively by Laila Skinner and C. E Seashore in collaboration, by M. T Henderson, and L. N, Vernon, involving the use of the Iowa Piano Camera, described in a special article, and illustrated by the complete recording of the last movement of Beethoven's " Moonlight " Sonata. Unfortunately this is described, both in the contents and in the title to the article, as the first movement One hesitates to accept the suggestion that pianistic deviations are restricted to the attributes of time and intensity, as considerable individual modification of the " tonal quality " or " timbre " seems possible by the use of weight instead of suddenly applied force in key depression. Don Lewis contributes an article on the definition and physical determinants of pitch, and Joseph Tiffin analyses the recent contributions to the " science of the art of speech "

The work is a great achievement in exact æsthetics, and the only criticism one ventures is in response to Professor Carl Seashore's exclusive claim for the science (p 5) While such research is invaluable, it is obviously so only within its restricted field The intrinsic beauty of a work is independent of minute variations in its interpretation , the variations themselves show " little relationship " to those made when the work is reproduced by the same performer (p 48) , and Dr Harold Seashore himself admits that the " statistical approach can merely define what contemporary singers do " (p 46)

J M

The Nursery Class : By JESSIE WHITE, D.Sc. (Auto-Education Institute, pp. 92. 1s. 6d.)

A useful little book which sets out the position and claims of the Nursery Class as distinct from the Nursery School Dr. White notes a welcome change of attitude in the Nursery School Association which, in the past, has been indifferent or even hostile in its attitude to the Nursery *Class* An appreciation of the possibilities of these classes is important, since their comparative inexpensiveness makes them attractive to education authorities Unfortunately a recent Board of Education pamphlet on the subject—No 106—is descriptive rather than constructive and is justly criticized by Dr White for its omissions and for some of its over complacent statements The relation of these classes to the rest of the school is touched upon, and it is hinted that a good nursery class may and does exert its influence on the whole infant school This is a matter of extreme practical importance, for it may be hoped that such influences may lead to definite recognisation of the whole infants' department on the lines of the Princeville School at Bradford.

The book does not attempt, of course, to give detailed description of the whole work of a nursery class organised, as Dr. White would have it, on Montessorian lines It gives, however, a suggestive chapter on Exercises of Practical Life, which by detailed description of one or two activities, and by some helpful warnings of what not to do, form a good introduction to the subject Some further points of method and principle are discussed in later chapters There is also an interesting chapter on Criticisms Criticized The criticisms are fairly stated and answered and the reader is left with a clear grasp of the point at issue which is of real value

Finally, Dr White puts in a claim for the teacher's free evening, to which all might well pay attention The teacher is too often expected to spend his time out of school in endless " preparation," making of " apparatus," etc She should, on the other hand, be living and enjoying her own life and sharing in other interests. " It is an inestimable boon to her children when their teacher finds life beautiful and satisfying "

Safeguarding Mental Health By R. C. MACARTHY, S J, Ph D. (Bruce Publishing Co., Coldwell, Ltd, London, pp 297. 11s)

This book is written by a Jesuit professor, president of Marquette University in the U S A., and is meant chiefly for parents and teachers

It is one of the many books washed up by the wave of the Mental Hygiene movement, which originated largely in America, and still rolls on It is written with the conviction that the " tide of nervous diseases " can at least partly be stemmed by parents and teachers, if they are taught what to do and what to avoid in the training of children, and how to recognize danger signals.

The author accepts as inevitable the conditions of modern strain, with he holds largely responsible for the prevalence of neurosis, and tells us that we must change our attitude towards them by learning to keep our mental poise. This seems a somewhat debatable position

The book is written in a restrained and clear style, and gives a very adequate exposition of such questions as heredity and environment, and the various defence mechanisms, such as rationalization and compensation The brief mentions of Freudian ideas are not very accurate, and the treatment of phobias and other disorders is described too superficially. In fact all through the book one finds that deep-laid origins of neurosis and psychosis are barely touched upon

As might be expected there are sections on religion in relation to mental health, which are welcome in so far as this important subject is mostly omitted in books of this kind We are shown how religion in the true sense is a safeguard of sanity, and the difference between confession and psychoanalysis is well put.

Much sound advice is given to teachers with regard to the training of their charges, and to them the book may be specially commended as a good introduction to a very important subject

From Birth to Maturity By CHARLOTTE BUEHLER. (Kegan Paul, Trench, Trubner and Co., Ltd, pp 237 7s 6d)

This book, which has come into our hands somewhat late for review, is a rapid survey of various stages of development, divided into (*a*) the pre-school child, and (*b*) the school age Apart from the chapter on the first year of life, that on adolescence and that on testing of the pre-school child, the book does not follow all the general characteristics of each successive period, but rather certain aspects of mental life are selected as for example " the social development in the pre-school child " and " the child in response to Material " It is useful to have a book which refers to such a number of investigations carried out in Austria and Germany, though Dr Bühler includes also a good many references to American work Naturally in a short book which covers so wide a range of ages, some sections are necessarily sketchy in treatment—particularly adolescence, which covers only eighteen pages Dr Bühler's interpretations seem to us usually sound, though we should not be quite so confident in asserting them as she usually is Generalizations about the particular ages and characteristics are made rather too sweepingly on the somewhat limited bases At times one also feels, as another reviewer has pointed out in connection with another book, that Dr Bühler sometimes blends confusingly interpretations and facts, and some of the evidence given would be much more useful if more exact statements were made. For example Goodenough's generalization is quoted on the observation of anger in children from the ages of 6 months to 1½ years, and the greatest frequency at 1 year to 2 years commented upon without a statement as to how many children there were of the various ages In fact there were only 9 of that age observed by Goodenough

It is therefore as a stimulating introduction to a study of childhood that this book is useful, rather than as a comprehensive survey The English of the translator is at times somewhat vague and cumbersome. For example, there is a phrase " characterological tendency," and a reference to a child in the " family situation "

The New Era in the Junior School · By E B WARR (Methuen and Co , Ltd., London, pp. 136. 3s. 6d.)

This book is partly a summary of some of the important points in our present knowledge of children of junior school age (7–11 years), and partly a description of the actual child-study and practical teaching methods of the author

Useful, and often somewhat unusual points of emphasis are made, in summarizing what we know of junior children's needs For instance, emphasis on the necessity for periods of rest and peace in the education of children who get no quiet at home is an important point seldom stressed, and still more seldom implemented in school organization.

In response to questionnaires given in schools of different kinds by Miss Warr, she got some results that it might be wise for teachers to ponder " In elementary schools, needlework and knitting largely take the place of hand-work after the age of ten, and these are on the whole very unpopular."

In collecting the spontaneous questions of junior school children, Miss Warr found that " a large percentage concern natural phenomena and the universe "— movements of sun, moon and stars, thunder and lighting, on how things work such as magnets, candles burning, a telescope and a wireless, on the composition of complex substances such as paint, paper, bricks and elastic. There is spasmodic recurring interest in living creatures, but little evidence of any preoccupation of the junior mind with botany—that predominant subject of teachers' " Nature Study " lessons

Miss Warr's evidence on children's real interests do seem to justify her own indictment of the usual junior school curriculum—" We teach children so much that they do not want to know, while they are left to pick up incidentally, and usually outside school, the answers to things that really puzzle their enquiring minds "

Lists of children's favourite books and a good bibliography for teachers form an interesting appendix

Altogether a very readable book, particularly useful for young teachers, and with frank criticisms of some educational ideas that most teachers tend to accept without question J G M

Totem : *The Exploitation of Youth* : By HAROLD STOVIN. (Methuen, pp. 237. 5s.)

In this book the author examines critically various representative youth-movements of to-day, such as Toc H, Boy Scouts, Rover Scouts, the Y M C.A. and other boys' and girls' clubs which are connected with social service, and which have received general, though vague, public approval as aids to education and citizenship He suggests that they have certain common characteristics, such as an emphasis on emotional thinking, a lack of intellectual clarity and a pre-occupation with symbols and incantations, which in his opinion are indications that they veil a modernized totem-worship under such apparently harmless ideals as fellowship and the team spirit. He raises one very important question which it must be acknowledged educationists have so far not squarely faced If education in a democracy means the development of individuality and critical ability, are not these British youth movements, which encourage a kind of herd-feeling or " groupism," subtly hostile to education and freedom ? It is easy enough to recognise this danger in the semi-military youth-movements of totalitarian states. The great merit of Mr Stovin's work is that his analysis of British youth-movements shakes us out of our thoughtless complacency in regard to them and to such modern developments as the Jubilee Trust, the National Council of Social Service, and the Central Council of Physical Welfare. His whole treatment is provocative of thought, and is valuable as a clear indication of the need for some adequate touchstone of educational value before public money is voted to amateur educational and social service efforts. The real danger in this country at present is not so much in the youth-movements themselves, but in the growing tendency to bolster up these voluntary organizations by grants from public funds, and thus to side-track the real problem of education in a democracy and to defer those drastic improvements in the public educational services which have now become necessary O W

The Mental Heath Services (Oxford Survey of Social Services) · By E F Pinsent. (Oxford University Press for Barnett House, 1937, pp. 87 2s. net.)

The great increase in social services since the beginning of the century makes advisable a periodic survey or stock-taking of the various central and local organizations with their various powers and duties, both to prevent overlapping and to prepare for further advances Such a survey, therefore, of an area where there has been at work an enlightened enthusiasm has a general interest outside the locality concerned.

In obtaining the help of so experienced a collaborator as Mrs E F Pinsent to deal with the mental health services the Oxford Social Services Survey Committee have indeed been fortunate, for her experience of every branch of the problem of mental health is unrivalled.

Her report is much more than a description of the various organizations concerned, but is a most useful summary of the powers and duties of central and local authorities which concern mental ill-health and mental deficiency, together with a short historical introduction

The area concerned includes the City of Oxford and the counties of Oxfordshire and Berkshire, and Mrs Pinsent's report shows how the attempt is made to secure continuity of effort and the problem as encountered in an urban and in a rural community.

This little booklet will form an admirable introduction to the whole question of mental health for teachers and social study students.

Testing Children's Development from Birth to School Age: By Charlotte Buehler and Hildegard Hetzer. (George Allen and Unwin, Ltd., pp 191 12s. 6d)

This is a translation of the first German edition 1932, made by Dr Henry Beaumont Several other collaborators have contributed to the various tests for different periods It is a most welcome addition to the series of tests for the earliest years For the first year of life, ten tests are given for each month up to eight months and then ten for each two months. For the second year there are ten tests for the first quarter and second quarter and then ten for the second half of the year There are ten tests for each of the third, fourth, fifth and sixth years After the second year a number of the tests are very similar to those in the Binet, Terman, Cattell and other tests, but a considerable number are new tests, especially of a kind involving apparatus. The book cover states that these tests are not intelligence or performance tests, but are meant to test the development of the whole personality of the child. This is perhaps somewhat misleading in reference to the later tests, though of course it has long been realized that the Binet tests, and indeed all individual tests, reveal elements of character and temperament Many of the earlier tests may be described as tests of activities in which we do not as yet know the extent to which any general factor or factors of intelligence are involved.

The use of the somewhat elaborate apparatus in a number of tests is no doubt a disadvantage from certain points of view, but it will add to the interest that many children will feel in the tests For a final standardization of these tests twenty children were used for each of the sets of monthly tests for the first year, twenty-five for each stage of the second year, and not more than ninety-five in all for the third to the fifth years

Another factor that has to be borne in mind is that, as the authors state, the children used in the tests were largely taken from the poorer population of Vienna, the children from the first and second years being taken from municipal homes So they would hardly be representative of the whole population

The book should be especially useful for testing infants under one and between one and two years of age and more particularly if the standardization of these years could be revised after the inclusion of children from homes of higher social ranks

Teaching Poetry · Compiled by the Society for Teachers of English (Oxford Univ Press., London, Humphrey Milford, 1937, pp. 72 2s 6d.)

In "Teaching Poetry" practical suggestions are made for three lessons for each of the four age-groups of pupils from eleven to sixteen The poems chosen are chiefly those usually found in school anthologies

Notes of a poetry lesson, whatever they may mean to their author, and however successful the lesson they represent may be or have been, can only assume vivid life in the mind and heart of a truly receptive reader, who already knows how to approach the study of poetry This book may therefore prove suggestive to those who know how to interpret it In the hands of those not so equipped it may induce, not an added thoughtfulness about poetry and how to teach it, but mere unintelligent imitation of methods devised by others It is thus a potential source of danger to the cause it seeks to serve Nevertheless, any sign that the teaching of poetry is being taken seriously by responsible persons is reassuring, and the book can be welcomed for the soundness of its general principles, made clear in the introduction and epilogue, and the seriousness of its intention

Grey of Fallodon By G. M Trevelyan. (Longmans, Green and Co., pp. 393. 16s.)

As the present reviewer is an admirer of Edward Grey, he regards it as high praise to say that this biography is worthy of its subject Grey himself was a strange blend of the man of affairs and the recluse who loved nature and especially birds. and Professor Trevelyan shows his own breadth of mind in being able to enter remarkably into both these aspects of Grey's life Of special interest is the early record of Grey's education, culminating with the strange fact that he was sent down from Oxford for not paying due attention to prescribed studies We write "prescribed" advisedly because he was reading other things And it is a somewhat pathetic incident that is recorded of his departure, when Jowett said to him affectionately, "You will read, won't you. Please do." The trouble in Grey's academic career seems to have begun when he was at Winchester, where at first he was ambitious, but where he was prevented from rapid promotion This is clearly brought out in the quotation from his autobiography.

A Young Girl's Diary Translated from the German by Eden and Cedar Paul, prefaced with a letter by Sigmund Freud. (George Allen and Unwin, Ltd., pp 272. 10s. 6d.)

This is a second impression of a book first published in 1921 and now issued at a somewhat reduced price The book reads like a genuine diary and affords an interesting psychological study, but it hardly provides the novel revelations suggested by either the publisher or by Freud in the passage quoted in the preface Nor does the substance matter seem to justify his assertion that the diary shows that the "mystery of sexual life takes entire possession of the growing intelligence" The editor, by the way, has purposely left trifling faults in grammar and suggests that they should be looked upon as errors brought about by the influence of the unconscious This should prove a new and useful excuse for the ungrammatical productions of our more wide-awake school pupils !

The Human Factor in Industry By Eric Palmer. (Chapman and Hall, pp 37. 2s.)

A brief survey of the improvements in conditions of labour in factories and elsewhere with evidence of consequent advantages on the whole to both employers and employed. Attention is called to the healthier surroundings, greater contentment and very considerable reduction in accidents, but the writer also indicates places in which improvements are still to be made; indeed, in some instances one might suggest they are long overdue What is known as strap-hanging, for example, imposes a strain on many people whose labours during the day are fatiguing enough without this in addition as they go to and from their work.

This little book introduces ideas which many employers and social workers might like to take up and develop in detail now so useful a lead has been given.

Diagnosis of Individual Difficulties in Arithmetic: By F. J. SCHONELL. (Oliver and Boyd, pp. xi+115. 2s. 6d.)

This is a book that all who teach young children or backward children should read The tests are carefully graded and full instructions are given both as to the method of using the tests and the interpretation of the results.

The chapter dealing with backwardness in arithmetic is of particular interest, and the final chapter, suggesting methods of dealing with the weaknesses revealed by the tests and containing a sub-section on problem work, deserves careful study

N M B.

The Good New Days. By MARJORIE and C. H. B. QUENNELL. (B. T. Batsford, pp 112 6s.

This book is intended for young people It explains in simple language some outstanding problems of to-day, such as unemployment, town-planning, agriculture and various social problems While showing that present day conditions are better than they were in the "good old days" the authors emphasize that there is ample room for improvement in the future. The reviewer (a "young person") found the book very readable and not too technical in any part.

Love and Thought, in Animals and Man: By Dr. SERGE VORONOFF. (Methuen and Co., Ltd, pp 138, 6s)

Those people who pay 6s for this little book on Love by Dr Voronoff, with the expectation of some spicy bits, will be disappointed. Psychologists will learn little new either from the collection of reports (often rather vague) showing the intelligence and affection of animals, or from the various pensées, quotations and sketchy stories, including that of the big, bad bull.

Conversations with Children By DAVID and ROSA KATZ (Kegan Paul, Trench, Trubner and Co., Ltd., pp. 318. 10s. 6d.)

This is a record of 141 brief conversations, chiefly between one of the authors and their two little boys of 6 and 4 years of age It is claimed that the records are practically verbatim and they read as such. They afford further useful material for the study of child thought and conversation. The authors make many useful comments upon this material although we think there are in some cases alternative interpretations that might be given with equal justification.

A NEW FEATURE IN THIS JOURNAL.

Summaries of Degree Theses in Educational Psychology.

THE Editor thinks that it may be useful to have in the JOURNAL brief outlines of enquiries in educational psychology, which have been reported in theses approved for a University degree.

This may be worth doing even if the thesis is not thought to be suitable for publication as a whole; or it may be done as a preliminary report to a more extended report later on, which the author wishes to defer.

Such brief reports may also be useful guides to research workers who, having seen a brief outline of the results, may like to consult the thesis in the University Library in which it is housed.

The Heads of Departments of Education or Psychology in Universities, University Colleges or Training Colleges, are invited to forward for consideration such outlines as they think worthy of publication Usually the length may be anything from about 300 to 500 words.

It it requested that a statement should be given, showing the date of the thesis, and the library in which it can be consulted, if any

Heads of Departments are asked specially to sub-edit these outlines, and make them as clear as possible, consistent with brevity.

The first outlines will appear in the next number of the JOURNAL